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USSR Report

SCIENCE AND TECHNOLOGY POLICY

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ORGANIZATION, PLANNING AND COORDINATION

COOPERATION IN NOVOSIBIRSK MACHINE TOOL, TOOL BUILDING INDUSTRY

Moscow SOVETSKAYA ROSSIYA in Russian 13 Nov 85 p 2

[Article by SOVETSKAYA ROSSIYA special correspondents N. Senchev and A. Chuba under the rubric "Sectorial Science: The Impact of Efficiency" (Novosibirsk-Moscow): "The Inertia of Detachment"]

[Text] It is enough for Valentin Romanovich Shelkovnikov to get up from behind the director's desk and to go to the window, and before his eyes is nearly the entire "geography" of the relations of the affiliate of the institute, which he heads, with local enterprises. The buildings of the Plant imeni XVI partsyezda and the Novosibirsk Tool Plant can be seen well across the deserted autumn Ob River. Quite nearby, three to four streetcar stops away, are the gates of the Siblitmash and Tyazhstankogidropress plants. This closeness is of particular attractiveness for the affiliate. Subdivisions of the same ministry--the Ministry of the Machine Tool and Tool Building Industry--they have the rarest opportunity to cooperate with each other without intermediaries, long-distance telephone service, and lengthy business trips.

Why then, when the conversation turns to the efficiency of their relations, does the director of the design organization fall into lengthy pensiveness? Why does this question also put at a loss the managers of the Novosibirsk enterprises of the Ministry of the Machine Tool and Tool Building Industry?

Everything would be simpler if the affiliate of Orgstankinprom was a failure. But the whole point is that the thematic plans of the affiliate are saturated, in them there are many developments which enterprises need. At every plant they will willingly demonstrate the results of the joint efforts of the designers and specialists of the enterprise. For example, at the tool plant they will recall without fail the original machine tool press, which was developed by associates of the affiliate and which made it possible to produce a complicated item quickly and practically without waste metal.

It is possible to continue the list of useful jobs performed by associates of the affiliate, but all the same it will not explain why the Novosibirsk plants of the Ministry of the Machine Tool and Tool Building Industry, while having nearby an affiliate of the State Planning, Technological, and Experimental Institute of the Organization of the Machine Tool and Tool Building Industry

(that is how Orgstankinprom is expanded), go and pay their respects to designers and scientists of Moscow, Leningrad, the Ukraine, Georgia.... The workers of the affiliate in turn are traveling about the entire union. They perform 85 percent of the jobs for enterprises which are located outside Novosibirsk. As we see, the territorial proximity provides only 15 percent of the mutual attraction of the affiliate and the enterprises.

Of course, one institute cannot satisfy the diverse needs of the plants. And still the simple, it would seem, question of the interrelations with local enterprises did not force V.R. Shelkovnikov to become pensive for nothing. The relations with them, he admitted, are far from the ideal. What is the reason? Valentin Romanovich sees it in the poor introduction by the enterprises of the results of the labor of the workers of the affiliate.

"The value of the unintroduced developments, which were carried out, as a rule, in accordance with the orders of the enterprises themselves, exceeds 1.5 million rubles," he says. "This is neither more nor less than two annual plans of ours. Imagine: 2 years of work and zero impact. Who is to blame? For the most part the plants. They try on for too long a time the technical solutions which we propose."

Well, there is truth in the arguments of the director of the affiliate. During this five-year plan, for example, the organization headed by him has turned over to the Tyazhstankogidropress Plant 9 developments with an estimated value of 100,000 rubles. Only one is just managing to be introduced. It is also possible to cite such examples with respect to other plants. At first glance it seems that typical, repeatedly described interrelations between an institute and a plant are present.

But we will not hasten to draw conclusions. Let us listen to the production workers.

"You ask why we order designs, pay much money for this, but then put them on the shelf?" Yu.N. Kalekin, chief engineer of the Tyazhstankogidropress Plant, repeats the question. "Imagine: your suit has worn out, but at the clothing repair and tailoring shop they suggest something unattractive, uncomfortable, and obsolete. And there is nowhere else either to buy or to order it. What remains to be done? With the utmost reluctance you order a suit. But while they are making it, it goes completely out of fashion, and it is made even worse than the model. You take a look and give it up as a bad job, the old one still seems all right, it is possible to wear it a year or two. We also have approximately such relations with Orgstankinprom. Let us take the plan of the complex mechanized sections for the machining of fine-plane parts. The drawback of the plan lies already in the fact that only one technological part is envisaged in it. But what about power supply? But what about the supply of compressed air?"

The incompleteness of the plan is not all the trouble of it. The development named by Yu.N. Kalekin is also not being introduced for the reason that it has become obsolete. Back in the early 1970's the affiliate gave a similar plan to the Ulyanovsk Plant of Heavy and Single-Design Machine Tools. Recently in response to the call of the Novosibirsk colleagues the Ulyanovsk machine

builders said frankly: the plan is bad, do not waste time and effort on its introduction.

We walk about the shops of the Novosibirsk machine tool building enterprises and time and again see crowded, dark structures, old, at times even prewar machine tools, and a large amount of manual operations. Yes, of course, in this here corner there is a modern unit, here the bay has been expanded, some plant can boast even of a new shop. Does this change the picture substantially? Of course not. Labor productivity is increasing more slowly than necessary, the growth rate of production is increasing more slowly than necessary, the proportion of metal-cutting machine tools and, consequently, the consumption of metal are almost not decreasing. The proportion of NC machine tools takes up less than 6 percent in the pool of machine tools of Novosibirsk plants. And what is more, they are being utilized at barely half capacity.

Here it turns out that, on the one hand, the collective of the affiliate of the institute is successfully fulfilling the plan, has interesting developments, and is even receiving awards of the Exhibition of National Economic Achievements for them, but, on the other hand, its many years (since 1952) of activity have not left a visible mark on the appearance of the enterprises served by it. It is now easy to deduce the reasons: the jobs, which the Novosibirsk Affiliate of Orgstankinprom is performing, for their most part solve special, peripheral problems, which do not effect the deep-seated processes of industrial production and do not influence its nature.

It should not be thought that this is the misfortune only of the affiliate of the organization of the capital. Recently, in August of this year, the Collegium of the Ministry of the Machine Tool and Tool Building Industry examined the question of the activity of the entire Orgstankinprom Scientific Production Association. The incompleteness of the plans being developed at the scientific production association, the rare use in them of advanced solutions, and other shortcomings are noted in the order of Minister B.V. Balmont, which was issued in accordance with the results of the collegium. The task was posed to correct the situation.

Will the Novosibirsk Affiliate be able to fulfill it? Judge for yourself. Today more than 300 people work here. The forces, in general, are considerable. However, in the collective there is not a single scientist with a degree. There are not enough specialists in several important directions. There is a very prosaic explanation for this: the low wages of designers.

It is quite obvious that it is necessary to take steps which will make it possible to change the situation radically. The organizational rearrangement of the affiliate, the strengthening of its potential, and provision with highly skilled personnel and modern equipment are seen as one of the priority steps.

What do they think about this in the ministry? We turn to V.N. Pokasyuk, chief of the Technical Administration of the Ministry of the Machine Tool and Tool Building Industry.

"Of course, we see all the weak spots of the Novosibirsk Affiliate of Orgstankinprom and do not intend to tolerate them," Viktor Nikitich says. "But it is necessary to begin the reorganization with the top--with the scientific production association to which the affiliate is subordinate. We are now preparing for this. As for the people of Novosibirsk, we have serious complaints against them. If they would a bit more often display initiative and come forth with suggestions on how to improve the work and to make it more efficient, we would, undoubtedly, help them."

Well, the complaints, I dare say, are justified. Only it is also possible to lodge them against the workers of the ministry. It cannot be said that they rarely come to Novosibirsk. If in so doing they would also, as envoys from the center are supposed to, look deep into the causes of the poor cooperation of designers and production workers, would make their own proposals, and would strive for their fulfillment, many of the problems, which built up over long years, could have been solved in good time. Now, as we see, their solution has been put off to an indefinite time.

Meanwhile it is hardly possible to agree with delays and postponements. The need to ensure rapid progress in the strategic directions of the development of the economy, to which, undoubtedly, machine tool building also belongs, is emphasized in the draft of the Basic Directions. One of the effective means of achieving this--it is noted in recent party documents--is the improvement of the organizational and economic forms of the integration of science and production.

If anywhere, the basis for this exists in Novosibirsk. It is another matter that it has a pronounced intersectorial tinge. The Siberian Department of the USSR Academy of Sciences has a strong scientific potential. Why not think about enlisting its scientists in the work of the affiliate? It is also possible to use more extensively for the solution of machine tool building problems the workers of the scientific organizations of other ministries, which are located in the city.

And it seems quite strange that the interests of the three technological subdivisions of the Ministry of the Machine Tool and Tool Building Industry itself, which operate in Novosibirsk, in practice do not intersect in any way. In addition to the affiliate of Orgstankinprom, two design organizations, one of which, incidentally, has a substantial computer base, are located here. Each of them is working on its own special problems. The question of the coordination of their efforts, as was learned from the discussion in the ministry, is not coming up in the very near future.

The Ministry of the Machine Tool and Tool Building Industry has outlined an extensive program of the retooling of enterprises and their changeover to the output of new, advanced products. However, the concern for the increase of the scientific and design support of industry, as is evident from the example of the Novosibirsk Affiliate, is in this program by no means of paramount importance. Meanwhile, it is quite obvious that, in beginning the radical reorganization of production, one should begin with reorganization in the supply subdivisions so that their potentials would conform to the increasing demands of enterprises.

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ORGANIZATION, PLANNING AND COORDINATION

REFLECTION OF SIBERIAN SCIENCE IN DRAFT OF BASIC DIRECTIONS

Moscow IZVESTIYA in Russian 20 Nov 85 p 2

[Article by Vice President of the USSR Academy of Sciences Academician V. Koptyug, chairman of the Siberian Department of the USSR Academy of Sciences, under the rubric "The Strategy of the Party Is Acceleration, Energy, Realism": "Science for Siberia"; capitalized passages published in boldface]

[Text] It is possible to define the core of the draft of the Basic Directions in one word: acceleration. The acceleration of scientific and technical progress is the basis for the outlined changes in both the social and the economic life of the country. And here great responsibility rests with science, including academic science, in the sphere of which fundamentally new technical and technological solutions, which frequently change radically the nature of production, originate and are formed.

The fact that the priority role of basic research is singled out once again in the draft, arouses profound satisfaction. For to this day one has occasion not that rarely to be faced with the underestimation of the role of this research. The responsibility of the USSR Academy of Sciences for the development of the theoretical principles of fundamentally new types of equipment and technology, the concentration of the efforts of all science on the most important directions of the present scientific and technical revolution, and the increase of the technical orientation of academic institutes is also emphasized. For the Siberian Department of the USSR Academy of Sciences the accomplishment of these tasks to a certain degree is being facilitated owing to the strategy which at one time was incorporated in the decisions of the party and government on the establishment in Siberia of complex scientific centers. Today at the institutes of the department many fields of research, which are decisive for scientific and technical progress, are represented and have undergone substantial development.

The "hottest" directions, in which the revolutionizing consequences for practice are already now clearly visible, merit special attention. These are the theoretical and technological principles of the development of new semiconductor devices and microprocessor equipment, quantum electronics, and lasers for industry. These are the methods of genetic engineering and new methods of breeding. This is the development of new highly efficient catalytic processes and so on.

The efficient and rapid passage of new ideas from origination to use in practice is an inherent condition of the acceleration of scientific and technical progress. The country cannot tolerate the fact that the accumulated potential is not being used fully and is not yielding a full return. Therefore, the Siberian Department of the USSR Academy of Sciences is intensifying the transfer of completed developments to the national economy. Here diverse experience has been gained, a specific set of actions through direct relations with enterprises has been verified by life. Long-term coordinating plans of bilateral cooperation with ministries and departments and statewide scientific and technical goal programs have been drawn up.

What has been achieved, however, does not give grounds for reassurance. The means of introducing new equipment in production will be certain and reliable only when in practice it becomes a component of the system of state planning.

On the threshold of the 12th Five-Year Plan the Siberian Department of the USSR Academy of Sciences took steps which were aimed at the more complete use of planning levers. The completed scientific and experimental design developments were submitted to the USSR and RSFSR State Planning Committees, the State Committee for Science and Technology, ministries, and departments. As a result of a comprehensive discussion it was recommended to include more than 130 developments in the sectorial and state plans for the next five-year plan. We intend to continue such work, having turned it into a permanent "system of the active tracking" of our proposals.

The further broadening of the outlets of science to the national economy requires the rapid buildup of the pilot production base. But it is not easy to solve this problem, since it is very difficult to obtain the necessary amount of contracting construction work. THEREFORE, IT WOULD NOT BE BAD TO EMPHASIZE IN THE BASIC DIRECTIONS THE IMPORTANCE OF THE SPECIAL-PURPOSE ALLOCATION OF CAPITAL INVESTMENTS ALONG WITH LIMITS OF CONTRACTING WORK. IT IS ALSO NECESSARY TO INCLUDE THE BUILDING OF FACILITIES OF THE PILOT BASE OF SCIENCE AND INDUSTRY IN THE LIST OF CONSTRUCTION PROJECTS WHICH ARE SUPERVISED BY THE STATE PLANS.

If the pilot production base is built up, scientific and technical complexes and engineering centers will gradually be established. The experience of their work within the Ukrainian SSR Academy of Sciences, as is known, demonstrates great efficiency. New steps in this direction have also been taken here. At the Tomsk Affiliate of the Siberian Department of the USSR Academy of Sciences, for example, a scientific and technical complex for laser instrument making has been organized on the basis of the Institute of Atmospheric Optics and the Optika Special Design Bureau.

Since it is impracticable to develop rapidly the production base of academic science in all the important directions for scientific and technical progress, it is necessary to unite the potentials and resources of various departments. And, as is emphasized in the draft of the Basic Directions, the establishment of interdepartmental scientific and technical complexes and centers is conducive to this. A republic engineering and technical center for hardening coatings has been set up under the Institute of Strength Physics and Material Science of the Siberian Department of the USSR Academy of Sciences. The

efforts of the department and a number of ministries of the RSFSR are united within it. Work is being performed on the organization of centers of plasma equipment and technology on the basis of the Institute of Thermophysics and the Energokhimmash Special Design Bureau of the USSR Ministry of Chemical and Petroleum Machine Building, as well as on beam technologies at the Institute of High Current Electronics.

But here, of course, the question of the status of intradepartmental and interdepartmental associations at the junction of science and production arises. It would be appropriate to analyze and disseminate the experience of the Institute of Nuclear Physics of the Siberian Department of the USSR Academy of Sciences, which is, in essence, a large engineering and technical center and supplies the national economy with powerful electron accelerators and other no less complex electrophysical equipment, which for the present has not been assimilated by industry. For the USSR Ministry of the Electrical Equipment Industry alone the economic impact of the use of the accelerators supplied by the institute in new technological processes came during the 11th Five-Year Plan to 250 million rubles.

The additional means, which were made available as an experiment to the Institute of Nuclear Physics of the Siberian Department of the USSR Academy of Sciences, contributed to no small extent to its formation as a large engineering and technical center. It, in particular, includes in the cost of the equipment being supplied a portion of the expenditures on basic research and on the strengthening of the experimental base, enjoys priority material and technical supply, and shifts within specific limits financial resources and the number of workers.

Time suggests: it is necessary to use such know-how more extensively. And, in particular, it is necessary to change over to similar conditions the scientific and technical complex for laser instrument making and the Avtomatika Scientific and Technical Association, which is being organized on the basis of the Institute of Automation and Electrometry and the Special Design Bureau of Scientific Instrument Making of the Siberian Department of the USSR Academy of Sciences.

The draft of the Basic Directions places great responsibility on the USSR Academy of Sciences for the coordination of scientific research in the country. This also applies to a significant degree to the coordination of research of a regional orientation. The experience of the work of the councils for the promotion of scientific and technical progress attached to the kray and oblast party committees in Siberia in contact with the centers of the Siberian Department of the USSR Academy of Sciences shows that academic science can actually do much for the integration of the efforts of research and design organizations regardless of their departmental affiliation.

The need to develop rapidly the national economic complex of Siberia and to achieve specific structural changes in it is emphasized in the draft of the Basic Directions. The Siberia Comprehensive Research Program, which was formulated by the Siberian Department of the USSR Academy of Sciences at the end of the 10th Five-Year Plan and underwent substantial development during the 11th Five-Year Plan, has become an important tool for the accomplishment

of th s task. In 1984 the status of a regional scientific research program of state importance was given to it by a decision of the Presidium of the USSR Academy of Sciences and the USSR State Committee for Science and Technology. Today the program unites the efforts of more than 400 organizations of 60 ministries and departments.

Not only ministries and departments, but also academic science of Siberia bear responsibility for the fact that for the present many problems of the development of the Western Siberian Petroleum and Gas Complex, the assimilation of the zone of the Baykal-Amur Railway Line, and the implementation of other large-scale programs have not yet been solved. The Presidium of the Siberian Department of the USSR Academy of Sciences is making efforts so that all the key problems of the scientific and technical progress of Siberia would find reflection in the Siberia Program. The assignments on the program for the 12th Five-Year Plan are now being refined with allowance made for the draft of the Basic Directions and the recommendations of the All-Union Conference on the Development of the Productive Forces of Siberia and the Acceleration of Scientific and Technical Progress in the National Economy of the Region, which was held in Novosibirsk.

Relying on cooperation with sectorial science, the department will intensify the study of the problems of the Western Siberian Petroleum and Gas Complex. In particular, the scientific work on the development of direct geophysical methods of prospecting for petroleum and gas, on the development of systems of the complete automated processing of aerospace, geological, and geophysical information, and on the development of physical and chemical methods of stimulating formations for the purpose of increasing their petroleum yield will be expanded and intensified.

It is necessary to introduce extensively in practice the development of chemists of the Siberian Department of the USSR Academy of Sciences on the obtaining of high-quality gasolines from gas condensate at the sites of its recovery. This will make it possible to decrease sharply the expensive delivery of gasoline to northern regions. For the solution of a wide range of scientific problems, which are connected with the advance of the petroleum and gas industry to the northern regions, the Siberian Department on the basis of the academic subdivisions, which operate in Tyumen, plans to open there the Institute of Problems of the Development of the North.

It is also very important to create in advance a scientific reserve for the identification and use of the petroleum and gas resources of Eastern Siberia, where scientists and production workers will have to deal with completely different types of deposits than in Western Siberia.

Powerful modern machine building should become the catalyst of the intensification of the entire national economy. Thus it is envisaged in the draft of the Basic Directions. The scale of Siberian machine building is significant. However, its profile does not completely conform to both the natural conditions and the present needs of Siberia. The question of increasing the output of highly productive machines and equipment, which are qntended for use in Siberia, the Far East, and the Extreme North, is posed in

the draft. Of course, this requires the expansion and intensification of the corresponding research.

The party and government have posed the task: to improve the ecological situation persistently, to use natural resources carefully and practically. These questions are exceptionally urgent for Siberia in connection with the high concentration of industry in individual regions of it. They are especially important for the nature of Siberia with its particular sensitivity to anthropogenic influences. The urgency and importance of these questions are increasing even more due to the enormous scale of a number of national economic projects which are being implemented in Siberia. It is advisable, therefore, to insert in the draft of the Basic Directions the addition: "TO IMPLEMENT AN EXTENSIVE SET OF PREVENTIVE CONSERVATION MEASURES, TO INTRODUCE A STRICT ECOLOGICAL APPRAISAL OF THE PLANS OF THE RENOVATION OF OPERATING INDUSTRIAL CENTERS AND ENTERPRISES AND THE CONSTRUCTION OF NEW ONES."

The settlement of the questions of the change of the specialization of the Baykal Pulp Plant, the sewage and gas emissions of which are doing harm to Lake Baykal and its coastal forests, and the halting of the discharge into the Selenga River of the most harmful sewage of the enterprises of Ulan-Ude is not to be delayed. Many methods of the purification, elimination, and recovery of harmful discharges of industry and agriculture and of the monitoring of the state of the natural environment have been developed within the Siberia Program.

An enormous reserve of saving is contained in the complete use of natural raw materials. So far, unfortunately, when developing deposits the degree of extraction of associated components remains low, although frequently their value even exceeds the value of the basic components. It is necessary to establish a procedure, in case of which the State Commission for Mineral Reserves attached to the USSR Council of Ministers will place on the balance sheet all the types of useful components of deposits in order to settle subsequently the question of their complete extraction and processing.

Given the organization in territorial production complexes (TPK's) of such processing of raw materials and given the establishment in them of mutually complementary works it is possible to obtain a significant saving. And, on the contrary, a narrow departmental approach to the development of new regions is fraught with serious losses, especially on the Siberian scale. At the same time the system of management of territorial production complexes for the present has not been completed and is insufficiently efficient. In order to implement the idea of comprehensiveness, the organs of the management of territorial production complexes and the planning and preplanning documents of the formation of territorial production complexes should be legalized. This question is urgent. Therefore, it is advisable to insert in Section XIV of the draft of the Basic Directions the addition: "TO DEVELOP IN THE VERY NEAR FUTURE THE ORGANIZATIONAL AND LEGAL BASIS OF THE FORMATION OF TERRITORIAL PRODUCTION COMPLEXES AND THEIR MANAGEMENT."

We have touched upon only a few questions which worry Siberian scientists. Many significant proposals and additions are already arising and will yet arise during the extensive discussion of the draft of the Basic Directions at

the institutes of the department. It does not arouse doubt that the launched national discussion of the precongress documents of our party not only will make it possible to refine them, but will also contribute to the further development of the creative activeness of all scientific collectives and to the mobilization of the forces and potentials for the achievement of the highest levels of the social and economic development of our homeland.

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ORGANIZATION, PLANNING AND COORDINATION

TOMSK OBLAST PROGRAMS OF SCIENTIFIC, TECHNICAL PROGRESS

Moscow SOVETSKAYA KULTURA in Russian 30 Nov 85 p 1

[Interview with Hero of Socialist Labor Academician V.Ye Zuyev, president of the Tomsk Affiliate of the Siberian Department of the USSR Academy of Sciences and chairman of the Council for the Coordination of Scientific Research attached to the Tomsk Oblast Committee of the CPSU, by TASS correspondent A. Russkiy: "Only in Union With Science"; date, place, and occasion not given; first paragraph is SOVETSKAYA KULTURA introduction]

[Text] Hundreds of scientific developments, which are connected with the development of the petroleum-production complex of the Ob River area, have received precise addresses of introduction. The Council for the Coordination of Scientific Research attached to the Tomsk Oblast Committee of the CPSU has helped to assimilate innovations which are providing the national economy with a significant economic impact. The experience of the integration of science and production and the role of scientists in the acceleration of the socioeconomic development of the region are the theme of the interview of TASS correspondent A. Russkiy with Hero of Socialist Labor Academician V.Ye. Zuyev, president of the Tomsk Affiliate of the Siberian Department of the USSR Academy of Sciences.

[Question] A large number of regional scientific and technical programs have been formulated in Tomsk Oblast. By what was the choice of sectors, for which these programs are working, determined?

[Answer] The conference of the party and economic aktiv of Tyumen and Tomsk Oblasts, at which the importance of the comprehensive development of Western Siberia was emphasized, confirmed the correctness of the know-how of scientific and technical integration, which has formed in our oblast. The council for the coordination of scientific research attached to the oblast party committee, the first in the country, was established in Tomsk 15 years ago. By this time they had already struck the first oil gushers in the northern part of the Ob River region. The large-scale scientific and technical programs, which were formulated on the initiative of the council, first of all were oriented toward the assurance of the rapid development of petroleum and gas deposits. The names of the programs speak for themselves: "Powder Metallurgy," "Technological Electronics," and others. Scientists of the Tomsk Affiliate of the Siberian Department of the USSR Academy of Sciences

undertook to carry out five programs, specialists of Tomsk higher educational institutions undertook to carry out five others. The time of the completion of the assignments, the supply of resources, and the economic impact were specified in detail for each of them in cooperation with the production workers. The Council for the Coordination of Scientific Research, of which managers of scientific and production subdivisions became members, not only can concentrate efforts rapidly on priority tasks, but also has the opportunity to check the fulfillment of the programs. All these programs were approved in the buro of the oblast party committee and acquired the force of directive documents.

[Question] What results have been obtained by the national economy during the 15 years of work of the coordinating council, of which you are the chairman?

[Answer] All 10 programs are being successfully fulfilled. I will cite two examples. The Automation Program has been in effect longer than the others. The Institute of Atmospheric Optics of the Tomsk Affiliate of the Siberian Department of the USSR Academy of Sciences is carrying it out. During the 10th Five-Year Plan the creation of the material base for the automation of technological processes and scientific research was its goal. The people of Tomsk succeeded in formulating earlier than others the standard entitled "Kamak." This complex makes it possible to control any pool of machine tools by means of electronics. While during the current five-year plan the "Kamak" standard has already been introduced at three large enterprises. This made it possible to obtain an annual economic impact of 1 million rubles. At just one of the plants the automation of technological processes made it possible to increase labor productivity by sixtyfold! "Kamak" has been approved as a USSR State Standard.

The second most productive and important program--Powder Metallurgy--is being implemented by the young Institute of Strength Physics and Material Science, which was recently established at the Tomsk academic campus. The efforts of several scientific collectives and enterprises have been united on the basis of intersectorial cooperation. Scientists have developed and introduced in production gas thermal methods and a laser and ion-plasma technology of the powder protection of drilling tools and other equipment which operate in the north. Powder treatment increased the strength of parts of machines by five- to tenfold. The scientists helped to establish their own shops of "small-scale metallurgy" at the Tomsk Petroleum Production Association, the Chemical Industry Construction Administration, and a number of Tomsk plants. The program yielded the greatest impact in the young city of Strezhevoy. Here they helped to increase the service life of drilling equipment by means of metallic powders, with which worn out parts are being reconditioned in a special shop.

This year four major programs have been considered and approved by the council at a fundamentally new level. It was decided during the next five-year plan to make the process of introducing scientific developments within these programs a mass process. Innovations will come to all the enterprises of the oblast. For the Automation Program alone, for example, this will yield an annual economic impact of 15 million rubles.

The Health Program is an important part of the large-scale Siberia Program. Tomsk scientists are helping to provide polyclinics with computer hardware, modern instruments, and equipment, computers are also coming to school classrooms. For young Siberians will have to implement the new complex programs of scientific and technical progress.

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ORGANIZATION, PLANNING AND COORDINATION

ECONOMIC AGREEMENT IMPROVEMENTS

Moscow KHOZYAYSTVO I PRAVO in Russian No 10, Oct 85 pp 23-26

[Article by Yu. Berliner, chief of the Research and Development and Design Department of the Ministry of Heavy and Transport Machine Building, Military Consumers Society's Union of Heavy and Trnasport Machine Building Technology: "Introduction of New Equipment: Reserves from the Economic Agreement"]

[Text] In the 11th Five-Year Plan significant steps were taken to accelerate the development and introduction of new types of vehicles, equipment, instruments and technology and to further deepen the integration of science and production. However, the work which has taken place does not yet fully meet the demand which has arisen.

The main reasons for the slow introduction of new equipment are, first, the inadequate validity (from a technical and economic point of view) of the suggested developments under the conditions of production and, second, unsatisfactory preparation (organization, technical, financial) of production facilities for their introduction.

The relation between research and development, prototype construction and technological work is based on an agreement. It is completed in accordance with the Model Provisions from Resolution No. 360 dated 5 August 1969, approved by the State Committee for Science and Technology. Over the years since it was passed, the requirements on the activity of scientific and technical organization branches and in the planning for the development of new equipment have changed a great deal. However, within the limits of the existing form of economic agreements, the tasks of today will be difficult to solve.

The title itself "On the Conduct of Research and Development, Prototype Construction and Technological Work" as well as its content are not oriented toward achieving the optimal final results--accelerated introduction of developments into production.

As is known, the construction of vehicles and equipment takes 5-7 years. Therefore, the period for development and completion of work, especially technological, must be considered in such a manner so that it, first, does not

become obsolete and, second, could be used in production for a specific period considering equipment restoration time.

The period from design to introduction of new equipment is characterized by several stages impacting on the final amount of time to introduction. This includes ordering complex articles, receipt of standard devices, preparation of mechanization, nonstandard and special technological devices, complete preparation for production, preparation and testing of the prototypes, organization of regular production and so forth. The existing context of agreements does not take their required form into consideration . Even when the work was conducted in accordance with the agreement (including the introduction stage) not all of the stages were indicated in the program of work. Neither the contractor nor the executive agent had a clear picture of the real period to introduction. At the same time the agreement did not provide for property sanctions for nonintroduction of designs. Fundamentally, steps taken to hold someone responsible were severe only for one party--the documentation developer (institute). For example, it provided that the executive agent pay the contractor a sufficiently significant forfeiture for exceeding the time limit under the agreement conditions and the contractor only paid a fine (no more than 500 rubles) for not receiving the results in a timely manner. Clearly such measures could not make a tangible impact on the interrelationship of the participants to achieve final results in the shortest amount of time.

Practice shows that instances of institutes not observing the conditions of the agreement rarely occur. Corrections in the requirements of the agreement arise basically at the initiative of enterprises. At the same time submissions by institutes to arbitration on questions connected with the nonfulfillment by the contractors (enterprises) of responsibilities taken under the agreement rarely result in decisions in its favor.

At the beginning of the 1970s, several ministries (Ministry of the Electrical Equipment Industry, Military Consumers' Society and others) began to introduce a new system of scientific and technical planning based on internal ministry orders (subject cards). They embody the principle of immutability in the "development-introduction" planning process. These documents establish the technical and economic requirements for executive agents, the period to completion and also the amount of financing. It was provided that, based on orders, the mutually connected institute plan of subjects and enterprise plans for new equipment be formed both in nomenclature and in finance relations. The order must satisfy both planning and accounting functions. As shown in practice, the orders do not solve these problems. They do not respond to the economic agreement content.

The economic experiments being conducted at the present time put special force in the need to accomplish tasks and responsibilities in accordance with agreements. The relationships formed between the institutes and enterprises during the work are based on two documents: initial (technical) requirements based on the technical and economic effectiveness projected for the work to be conducted and the economic agreement. In our opinion the content of this agreement must be improved.

In the Ministry of Heavy and Transport Machine Building, organizational and economic steps are being taken directed at improving the order of work in the institute plan of subjects and in the agreement relationships between institutes and enterprises during the development of new equipment. In particular, it was established that work on a plan of subjects would begin only with the availability of the corresponding documents. Subjects financed from the ministry's United Science and Technology Development Fund (YeFRNT) are included in the plan on the basis of initial requirements developed by the institute and acknowledged by the corresponding ministry directorates. They reflect the intended content and stages, the technical and economic results (expected) at its completion and the development innovation. Also stipulated here are the amounts and sources for material stimulation. The leading and other interested organizations concur with the initial requirements. If the work is complex and several organizations (including multifaceted--technical, construction, economic and so forth) take part in its development, then the content, volume and term of accomplishment of the stages provided for in the initial requirements along with the order of agreement and the provision of work are reviewed by each co-executive agent.

In the accomplishment of work in the plan of subjects under the economic agreement, the technical economic basis is given. In it are indicated the basis for the completion of the subjects in the plan, the state of the problem, the purpose of work, its innovation and technical level, expenditures to accomplish the subjects and introduce the results of the development, economic efficiency and the basic factors for which it is generated. In other words, at the stage of completion of the subject in the plan, the question on the possibility of achieving the final results in the proposed work is answered.

To accelerate the development and introduction of the work of the research and development and technology design organizations and increase the effectiveness of their use in the Ministry of Heavy and Transport Machine Building, a general provision on the order of accomplishing economic agreements to develop new equipment has been worked out and introduced for experimental purposes since 1 January 1985. Its basis is the Model Provision of the State Committee for Science and Technology approved on 5 August 1969 with a consideration of the experience of the enterprises and organizations in this branch of industry on a new system of planning, financing and economic stimulation.

Many Ministry of Heavy and Transport Machine Building institutes make agreements with enterprises to accomplish work with a consideration of all stages of the "development-introduction" process. Its participants, in particular, are the institute, the prototype plant and the enterprise. In spite of the established practice, when agreements are made between two participants in the process of developing new equipment (institute and enterprise-contractor, prototype plant of the institute and the enterprise contractor) on conducting work, the parties in the agreement are the three organizations: the institute, the prototype plant and the enterprise-contractor. This makes it possible to connect together all the participants in the "development-introduction" process. The economic agreement not only reflects the place and form where the work accomplished will be used but also

guarantees the contractor on the length of time for introduction in accordance with an approved timetable.

The directive set limits on the development of specific kinds of work, the accomplishment of which would not provide for their accomplishment within the set time limits. In particular, it was established that the branch technological institutes may complete the development of prospective technological processes, special technological equipment for the construction of new designs and the expansion and reconstruction of active enterprises only after approval of the apportionment of capital investments to the corresponding enterprise and periods for introducing objectives are confirmed. The customer presents the respective documents on the availability of resources and financial sources to him for conducting the indicated work. Thus, this sharply reduces the amount of "throwaway" work in the institution and their forces are directed to the solution of primary problems facing the enterprises.

Regulations provide that in work connected with the introduction of new equipment, the improvement of technology, mechanization and automation of operating plants a single agreement is drawn up which provides for all the stages from development of documentation to the introduction of the new equipment in production. Prior to the parties signing the agreement, the customer presents to the executive agent: an agreed set of initial technical documentation; information on the availability and sources of financing for all the work provided for by the program in the agreement (including the availability of financing for capital expenses); initial data for the technical and economic foundation and calculation of economic effectiveness of the proposed work and also proposals for the distribution between the co-executive agents of the economic indicators achieved as a result of introducing the development in production.

A mutual responsibility and interest of the organizations and enterprises (customers and executive agents) over the technical and economic level of preparation for production and achievement of the most effective results in introducing new equipment within the time stipulated in the agreement is increased. In particular, in the regulations it was determined that the executive agent will compensate the customer for actual losses, caused by insufficient quality of work and in this case return up to 30 percent of that which was received for funding of economic stimulation of resources by including them in the compensation from the United Science and Technology Development Fund.

There are corresponding requirements on the customer. It was established that he bears responsibility for the correctness and completeness of the initial data given to the executive agent for the technical basing and calculations of economic effect; the timely introduction of work provided for by the agreement, in the plan for new equipment, technical retooling and reconstruction of the enterprise; the timely preparation or acquisition of equipment, rigging and materials; the time period for installation, initial adjustment, mastering and completeness of the use of results of work according to the agreement; the timely and complete inspection of the standardization documents in connection with the introduction of new equipment; the timely

acknowledgement to the executive agent of the per unit technical and economic indicators and the transfer of resources to him in the economic stimulation fund agreed to in the agreement.

The main purpose of strengthened sanctions is so that both sides will be more demanding in the purposefulness of the work, analyze the organizational, economic and material conditions of conduct and achieve the final results in the established time periods. However, the sanctions provided do not completely solve the task of increasing responsibility of the sides for completing the conditions of the agreements.

This is explained mainly by the limits in the existing law which excludes the capability of using fines due to the incentive fund.

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The experimental introduction of new forms of economic agreement shows that some additional measures are necessary for the further improvement of planning work on new equipment and improving the interrelationships.

12747
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FACILITIES AND MANPOWER

COMBINED CHAIRS OF ACADEMIC, SECTORIAL, VUZ SCIENCE PROPOSED

Moscow IZVESTIYA in Russian 3 Dec 85 p 2

[Article by doctor of geographical sciences Professor G. Avakyan, chief of the Chair of Economic Geography of the Yerevan Institute of the National Economy, and Candidate of Technical Sciences V. Chalabov, chief of a laboratory of the ArmNIIprotsvetmet of the USSR Ministry of Nonferrous Metallurgy: "Joint Chairs of Higher Educational Institutions Are Needed"; capitalized passages published in boldface]

[Text] How much has already been written and said about the enormous scientific potential which the higher school has. Meanwhile it is being used extremely inefficiently--it accounts for not more than 15 percent of the scientific output being produced in the country. One of the basic reasons of such a situation consists in the fact that in accordance with established tradition only the wage fund and the number are planned for higher educational institutions for scientific research, while all physical assets and resources are allocated to sectorial scientific research institutes. Given such a state of affairs one should not count on success. What is to be done?

Our suggestion reduces to assembling in one powerful striking force science of higher educational institutions, academic science, and sectorial science. Our republic owing to its compactness and extensively developed science could become a suitable testing ground for the conducting of such an experiment. We propose to unite individual fields of science, having organized, for example, scientific educational associations in mechanics, mathematics, the history of the CPSU, economic geography, and so on. All the scientists of the given field of science will accordingly be a part of each such association, while either the scientific research institute or the higher educational institution will pay for their labor.

What could we obtain from this? First, the entire scientific potential of the republic in the given scientific field will be used with the maximum efficiency. Second, it will become possible to unite the material base of higher educational institutions, academic institutes, and sectorial scientific research institutes. The quality of teaching will increase, since all highly skilled specialists will be involved in educational work, and each one will conduct classes in his specialty.

As it seems to us, one should begin with the integration of the chairs of higher educational institutions, then connect to them scientific research institutions. Let us explain our views with a concrete example. In our republic the subject "economic geography" is being taught at Yerevan State University, at the Armenian Pedagogical Institute imeni Kh. Abovyan, at the Armenian Agricultural Institute, and at the Yerevan Institute of the National Economy. Independent chairs of economic geography have been organized at the three higher educational institutions. At the university only seven people work in it, of them only two have an academic degree in the given specialty, at the Pedagogical Institute there are three specialists, at the Institute of the National Economy there are eight specialists. It is clear that such miniature formations are not capable of ensuring the performance of educational and scientific research work at the proper level. That is why we regard as expedient the organization of a joint chair of economic geography of higher educational institutions at one of the named higher educational institutions, a chair which would serve all the other higher educational institutions.

We make the proposal: in the fourth section of the Basic Directions, which is entitled "The Acceleration of Scientific and Technical Progress and the Development of Science," to formulate the paragraph, in which the improvement of the interaction of the academic sector of science, the sectorial sector of science, and the sector of science of higher educational institutions, in the following manner: "TO CREATE THE NECESSARY CONDITIONS FOR THE EXTENSIVE SEARCH FOR NEW, ADVANCED, AND EFFECTIVE FORMS OF THE INTEGRATION OF THE ACADEMIC SECTOR OF SCIENCE, THE SECTORIAL SECTOR OF SCIENCE, AND THE SECTOR OF SCIENCE OF HIGHER EDUCATIONAL INSTITUTIONS."

7807
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FACILITIES AND MANPOWER

ACHIEVEMENTS OF BELORUSSIAN INFORMATION ORGANS

Minsk NARODNOYE KHOZYAYSTVO BELORUSSII in Russian No 10, Oct 85 pp 14-15

[Article by candidate of technical sciences Yu. Kovalev, deputy director of the Belorussian Scientific Research Institute of Scientific and Technical Information and Technical and Economic Research, and T. Sidorenko, chief of the Department of the Methodology of Scientific and Technical Information: "Increase the Efficiency of Information Supply"; first seven paragraphs are NARODNOYE KHOZYAYSTVO BELORUSSII introduction; passages within slantlines published in italics]

[Text] Much has already been said and written about the information explosion. On this level Soviet astrophysicist I.S. Shklovskiy made an interesting observation. If we take into account only television broadcasts, the scientist noted, we will see that in metric waves the earth emits power which is approximately a millionfold greater than natural power. With respect to this indicator our planet has greatly surpassed Saturn and Jupiter and in the solar system only the sun itself can compete with it. Representatives of other worlds, when studying the earth from space, might think that a civilization of information producers is developing on it.

In itself the observation, as we see, does not lack wit. If we look at this phenomenon with the eyes of an economist, one can safely speak about a new national wealth, which is being accumulated in information banks and is increasing with the development of science and the methods of the processing and transmission of the obtained knowledge.

How is one to use this wealth better? In our country the state scientific and technical information system (GSNTI) is performing an important role in the information supply of enterprises and sectors. Millions of specialists and scientists use its information-reference banks. The share of information, which is disseminated selectively, that is, is intended for collectives which are conducting responsible research and development in accordance with scientific and technical programs, is increasing.

The information services of large enterprises, scientific production associations, institutes, and institutions hold a special place in the state scientific and technical information system. These services accumulate databases which correspond to their sphere of activity. It is necessary to

see to it that these bases would not simply be accumulated, but would also be maintained at the highest level of knowledge and that the needs of not only "one's own" enterprises and organizations, but also many hundreds of others would be met. For this it is important to ensure an "ascending flow" of information to sectorial and regional scientific and technical information centers.

But the task consists not only in increasing the amounts, but also in promptly receiving and processing data and meeting the specific needs of the users of the information. Here one cannot do without computer hardware. Computers increase significantly the possibilities of scientific and technical information organs and make it possible to save creative labor much better.

In the materials, which we are offering to the attention of the readers, an account is given mainly of how scientific and technical information subdivisions operate on the local level. For these are the primary and, perhaps, the most important units of the system which is operating in our country. How quickly, purposefully, and completely the requests of developers and innovators, scientists and economic managers for reliable and complete scientific and technical information will be met, depends on them. As a rule, the scientific and technical information services, even at large enterprises, are small. Attention and support in their work are all the more necessary. The managers and public organizations of those enterprises, at which they are forming around the services voluntary assistants and are striving to enlist efficiency experts, inventors, and young specialists in information activity, are acting properly.

By increasing the level of information supply, we are thereby creating better prerequisites for the improvement of all production in conformity with the requirements of scientific and technical progress.

The Relay Race of Experience: Not All Stages Are Equal

/The scientific and technical information organs of our republic are making an important contribution to the matter of accelerating scientific and technical progress. During the years of the 10th and 11th Five-Year Plans the structure of the republic scientific and technical information system was streamlined, and the directions of its activity were also clearly formulated. In improving the information supply of scientific and technical programs and increasing the efficiency and quality of the service of consumers, the scientific and technical information organs are using more and more extensively information processing, retrieval, and transmission equipment and are using the press, radio, television, the movies, and exhibitions for the purpose of promoting innovations./

The Belorussian Scientific Research Institute of Scientific and Technical Information and Technical and Economic Research of the Belorussian SSR State Planning Committee with the Republic Scientific and Technical Library and printing industry enterprise, intersectorial territorial centers in Brest, Vitebsk, Gomel, Grodno, and Mogilev, and 93 permanent information subdivisions in ministries and departments of republic subordination and at enterprises and organizations, which are subordinate to them, operate in the republic

scientific and technical information system. In all 571 permanent information subdivisions, as well as specialists, who perform information work through the combining of jobs, are working on the territory of the republic.

These subdivisions carry out the gathering, processing, storage, analysis, generalization, and dissemination of scientific and technical information on domestic and foreign achievements of science, technology, and advanced know-how for the purpose of its practical use by specialists and scientists for increasing the efficiency of development and shortening the time of the development and introduction of advanced equipment and technology.

The information subdivisions of enterprises and organizations of the republic, cooperating with the information organs of various levels, which belong to the state scientific and technical information system, receive a large flow of information materials for their use in production activity. Thus, for example, enterprises and organizations of the republic receive annually from the Belorussian Scientific Research Institute of Scientific and Technical Information and Technical and Economic Research more than 3,000 descriptions of survey and express information and leaflets on advanced production know-how and scientific and technical achievements, 1.2 million copies of standard technical, patent, design, and technical documents, and other materials. The information subdivisions at enterprises and organizations are a kind of filter, which selects from the total flow only that which is necessary for the solution of current and long-range production problems.

As an example of the good organization of scientific information activity it is possible to cite the Minsk Worsted Combine, the Plant of Automatic Lines, the Motor Vehicle Works, the main enterprise of the Luch Production Association, the Scientific Research, Design, and Technological Institute of Founding of the Automotive Industry, as well as the Gomselmash Plant and others. Their comparatively small information subdivisions achieved good results in their work.

The Minsk Worsted Combine introduced 161 innovations with an economic impact of 758,100 rubles, the Minsk Plant of Automatic Lines--160 innovations with an economic impact of 325,300 rubles, the Luch Production Association--192 innovations with an economic impact of 1,748,000 rubles, the Gomselmash Plant--350 innovations with an economic impact of 820,400 rubles. These indicators are significantly higher than those which similar enterprises and organizations have, and they were achieved mainly owing to the efficient organization of information activity, which envisages the active participation in it of leading specialists who jointly with workers of information services perform systematic work on the technical and economic evaluation of the advisability of the introduction of innovations, which have been borrowed from various sources, as well as take a direct part in their introduction.

The best information subdivisions in their activity rely on the active assistance of technical information workers and expert reviewers, their workers fulfill their tasks and functions well and know the basic problems, which are being worked on by labor collectives, the information needs of specialists, as well as the bottlenecks of production. This enables them to carry out the purposeful making up of information-reference banks and the

delivery of current information to consumers. Effective information activity is impossible without an efficient system of the passage and study of information materials, the selection and introduction in production of borrowed innovations. Constant and active monitoring of the practical use of information is also needed.

The active work of scientific and technical information services often stimulates specialists and forces them to examine information materials promptly and to use them in practice. The efficient interaction of the services with specialists also governs the accomplishment of another special-purpose task--the organization of the preparation and transmission of new information in accordance with the planned and realized results of work.

Last year the scientific and technical information service jointly with specialists of the worsted combine prepared 120 information cards which reflect the advanced know-how of the enterprise. The Belorussian Scientific Research Institute of Scientific and Technical Information and Technical and Economic Research published five information leaflets on the advanced know-how of the workers of the Minsk Worsted Plant and two on scientific and technical achievements (NTD). At the Gomselmash Plant 163 information cards were prepared, while the Gomel Scientific and Technical Information Center in accordance with the materials of the enterprise published 20 information leaflets on advanced know-how and 1 on scientific and technical achievements. Efficiency, systematicness in work, the orientation of the scientific and technical information service toward the end result, and the extensive use and introduction of borrowed innovations increase the prestige of the information service.

However, there are also examples of another kind, when the scientific and technical information subdivisions do not contribute to the increase of production efficiency and the acceleration of scientific and technical progress. The weakest network of scientific and technical information organs is in the republic ministries and departments. Their permanent information subdivisions are small and frequently are not capable of carrying out information supply in conformity with the demands being made. At those enterprises, where the work on scientific and technical information is being performed through the combining of jobs (and in the republic the majority are of this kind), specialists engage in information activity occasionally. This concerns the majority of enterprises of the Belorussian SSR Ministry of Housing and Municipal Services (the Dyatlovskiy Rayon Production Administration of Housing and Municipal Services, the Volkovysk Administration of Water and Sewer Services, the Grodno Oblast Vodokanal Production Association, the Pruzhany Combine of Municipal Enterprises), the Belorussian SSR Ministry of Highway Construction and Maintenance (the Avtomagistral RMU, Uzda Road Maintenance Section No 163), the Belorussian SSR Ministry of Motor Transport (Berezino Garage No 22, Zhodino Garage No 18, Mogilev Garage No 14), the Belorussian SSR Ministry of Agriculture (the Voskhod Kolkhoz of Oktyabrskiy Rayon, the Kolkhoz imeni Michurin of Kalinkovichskiy Rayon of Gomel Oblast), and other ministries and departments.

The enterprises and organizations, at which there are no permanent subdivisions, while the information work is performed by engineers and other

specialists through the combining of jobs, need to establish public formations (public scientific and technical information bureaus, patent bureaus, and others), to enlist specialists of all subdivisions more extensively in work on the study and evaluation of materials, to cooperate more closely with sectorial scientific and technical information organs, the Belorussian Scientific Research Institute of Scientific and Technical Information and Technical and Economic Research, and the scientific and technical information centers of the republic, and to use actively their holdings, automated databases, the "question-answer" mode, and interlibrary loans.

In recent years the workers of the information services have been included more and more often in the subdivisions, which perform work on new equipment and the scientific organization of labor or other operations and within which they lose independence and frequently begin to fulfill tasks which are not characteristic of scientific and technical information organs. Thus, for example, up to 1985 in the Belorussian SSR Ministry of Local Industry the Scientific and Technical Information Department of the Belorussian Design and Technological Institute of Local Industry of the Progress Scientific Production Association performed the functions of the main (sectorial) scientific and technical information service. A department of inquiry, patent studies, and information has now been established in place of it. The permanent scientific and technical information service at the Gomel Planning and Design Bureau of the Oblast Administration of Local Industry, at the Svetlogorsk Pulp and Paper Plant, and at the Minsk Belarus Department Store and Central Department Store has also been reduced. The rate of replacement of personnel of scientific and technical information services, especially those who perform this work through the combining of jobs, is unjustifiably high. Thus, at the Slutsk Motor Vehicle Repair Plant of the Belorussian SSR State Committee for the Supply of Production Equipment for Agriculture in 4 years 4 workers were replaced, at Road Maintenance Section No 107 (the city of Liozno) of the Belorussian SSR Ministry of Highway Construction and Maintenance in 3 years 3 workers were replaced.

All this attests to the underestimation on the part of executives of ministries, departments, enterprises, and organizations of the republic of the importance of information services in the identification, study, generalization, and dissemination of advanced production know-how and scientific and technical achievements.

At the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress it was noted that the mobilization of organizational, economic, and social factors, the establishment of order in everything, and the improvement of the organization of production for the purpose of the better use of what the country has are a priority task. These words fully apply to information organs. Their work should be efficient, prompt, and goal-oriented and should contribute to the solution of key problems of the development of production and the timely and high-quality fulfillment of the assignments and stages of scientific and technical programs.

7807
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AUTOMATION AND INFORMATION POLICY

BELOTSERKOVSKIY ON APPLICATIONS OF COMPUTER TECHNOLOGY

Moscow AGITATOR in Russian No 24, Dec 85 pp 19-21

[Interview with academician Oleg Mikhaylovich Belotserkovskiy, rector of the Moscow Physical Technical Institute, by G. Shumskikh under the rubric "The Achievements of Science and Technology for Production" (Moscow): "The Computer Serves Man"; date and occasion not given; capitalized passages published in boldface; first two paragraphs are AGITATOR introduction]

[Text] Not by chance is electronic computer technology being called a catalyst of scientific and technical progress. But it will be able to perform successfully such a responsible mission only if it becomes a reliable tool in the hands of the scientist and the worker, the teacher and the student, every specialist.

How is the computer helping man, how is their interaction organized, how ready are they for joint creative work? What is it necessary to undertake for the more extensive use of computers in various areas of human activity? We asked academician O.M. Belotserkovskiy, rector of the Moscow Physical Technical Institute, to tell about this.

[Question] Oleg Mikhaylovich, to what is the urgency of the problem of the mass mastering of electronic computer technology attributable?

[Answer] This problem was posed by life itself. Direct attention to how economic relations and the management of the national economic complex have been complicated, what revolutionary changes are occurring in equipment and technology, how refined scientific research is becoming, and how quickly the nature and content of the labor of practically all categories of workers are changing. The need for the increase of labor productivity requires more and more urgently the increase of the capacity, speed, temperatures, pressures, and other parameters of the production process. Other social needs, for the satisfaction of which new machines, equipment, raw materials, materials, and first of all people are needed, are also developing in the same direction. Try, for example, without the aid of electronics to keep track of the operation of a high-speed paper-making machine or a rotary conveyor line, which literally shoots out thousands of finished items a minute. But how is one to cope with the control of such a bulky and cumbersome object as floating drilling rigs? What is the designer to do, if he has to sort out manually

hundreds, and at times thousands of intermediate decisions, until the best one is found? How is one to generalize and systematize information, if in the world more than 2,000 printed pages on just 1 scientific and technical theme are published in 1 minute? How difficult the task of the timely delivery of cars to thousands of facilities of railroads appears....

Here we are no longer speaking about the problems of the designing and development of new equipment. Or, for example, the space flight of man. It is clear that a large series of computer experiments precedes each such flight. They help, for example, to foresee the effect of various factors of flight on the body of the crew members. Effective forms of spacecraft, the optimum designs of nozzles, propulsion systems, shapes of the wings of aircraft, and so forth in most cases are chosen today with the aid of computers.

The field of science, which is called INFORMATION SCIENCE, deals with all these questions. In the broad sense it includes the hardware (computers) and the means of its use in scientific research and physical production.

The penetration of information science into "nontraditional" fields of science for it (biology, medicine, history, philology, sociology) is a characteristic trait of today. Precisely here--at the junctions of sciences--we have the right to expect significant gains. Thus, the joint efforts of medical people, physicists, and mathematicians led to the organization at the Moscow Physical Technical Institute of the new Faculty of Physical Chemical Biology and Biotechnology, while a biocybernetics laboratory was organized under the Scientific Council of the USSR Academy of Sciences for the Complex Problem "Cybernetics"....

The basic direction of the use of information science in physical production is its AUTOMATION on the basis of electronics, starting with groups of machine tools, lines, and shops and ending with enterprises as a whole. Electronics is taking upon itself more and more often the control of technological processes in industry, ensuring rapid adaptation to changes of the production program. It is opening the way for the extensive use of industrial robots and manipulators, flexible readjustable systems, and NC machine tools, is ensuring the optimum operating conditions of equipment, and is creating the prerequisites for the economical use of raw materials, materials, and all types of energy and fuel.

In agriculture computers can control the operation of plows and machines for the harvesting of hay; they maintain the optimum position of the cutting bar, the grain collector, and the straw separator in the combine and increase the precision of sowing and the saving of planting stock. In transportation computers are being used for the control of the freight flows, intersections, and passenger transportation, sell tickets, and help the driver to select the most economical operating conditions.

Automation in industry (with the exception of continuous processes) will increase labor productivity by 2- to 2.5-fold, while in continuous processes will free up to half of the number of workers. Speaking at the conference in the CPSU Central Committee on questions of the acceleration of scientific and

technical progress, Comrade M.S. Gorbachev cited the example of the use of computer-aided design systems in the design bureaus of the aviation industry. This made it possible to increase labor productivity by threefold and to shorten the time of the designing of items by 2.5 years.

At present the automation of socioeconomic processes--the planning and management of the economic mechanism at different levels, the automation of office work, types of services, criminology, labor safety techniques, and others--is a very urgent task. Today the use of computers is yielding the greatest impact precisely in the social sphere (thus, in the developed capitalist countries about half of all the computers being used are being channeled here). Automatic washing machines, clocks, microcalculators, and so on can serve as an example of the use of electronic engineering in daily life.

[Question] Electronic computer technology appeared comparatively recently. Nevertheless in its development it has already gone through several generations. By what are they characterized and what is being done to facilitate the interaction between computer and man?

[Answer] The stages in the development of electronic computer technology, or, as they are still called, generations, are connected first of all with the increase of the speed and the size of the memory of computers. These parameters change from generation to generation by approximately an order of 10. The material basis of the transition to more advanced electronic devices is the change of their element base.

Thus, vacuum tubes constituted the element base of the first-generation computers which appeared in the early 1950's, while cathode-ray tubes were used as the memory. These computers were capable of performing from 100 to 1,000 operations per second.

The second generation of computers encompasses the period from the late 1950's to the middle of the 1960's and is connected with the development of the semiconductor industry. They were intended not only for the facilitation of computations, but also for the control of production processes and the analysis of economic information.

The further development of microelectronics led to the creation of integrated circuits, along with which the age of third-generation computers began. The resources of computers increased--to tens of millions of operations a second. The unusually high density of components of the microcircuit on the chip was a result of revolutionary changes in microelectronics and the technology of instrument making. Computers became more miniature, more reliable, and less expensive. The average time between failures of the new systems, which were equipped with a third-generation element base, increased as compared with the hardware of the 1950's by an order of 10^4 and even 10^5. It is possible to regard the third-generation computers as the turning point to the mass user. National information and computer databanks and networks, which were provided with outlets for the use of information, began to be formed.

The beginning of the 1970's was marked by the development of the first microprocessor, which became the basic, "thinking" part of all subsequent

modifications and generations of electronic computer technology. In essence, this is the command post of computers, which gives signals to the control devices. The "training" of a microprocessor is a complex matter which requires the great skill of its teacher--the programmer. This is done by means of a set of programs, which have been prepared in advance and in which the future specializations of the microprocessor are incorporated. It is sufficient to use one type of program, and the microprocessor will, for example, send commands to the control devices of an NC machine tool, in another case will perform the duties of an inspector, and in a third case will help the designer. Such general-purpose possibilities of microprocessor equipment served as a stimulus to the production of personal and professional (oriented toward a specific type of activity: editing work, accounting, and so on) computers. The latter are being developed, as a rule, on the basis of a single chip, in which the microprocessor is also placed. The miniature nature of microprocessor devices makes it possible to incorporate them easily in practically any objects which are to be controlled.

Fourth-generation computers are being developed on the basis of multiprocessor computer systems, for which large and very large integrated circuits are the basis. Each such integrated circuit is in itself a microcomputer. Fourth-generation computers, in essence, also consist of them. The prefix "super" characterizes most the computers of this generation. They are distinguished by superhigh speed (billions of operations a second) and a superlarge memory. It is also not a long way to fifth-generation computers, as the element base of which various optical devices, first of all lasers, will be used. Research is being conducted on the development of computers on the basis of biological principles. All of this will make it possible, apparently, to closely approximate in technical systems the characteristics of the human brain.

Along with basic research, which is aimed at the coming future, much work is being performed on the simplification of the interaction between computer and man. From where did this problem arise? At the initial stages of the development of computers scientists and specialists devoted priority attention to the very principle of computer data processing and, of course, thought to a lesser extent about simplified methods of communication with the computer. It was necessary to adapt to the conditions which were dictated by the principle of the operation of electronic systems. The further development of electronic computer technology led to the appearance of various computer languages. For the present they remain accessible to specially trained people.

However, there are devices by means of which it is possible to conduct a direct dialogue between man and the computer. These are DISPLAYS. They ensure the visual perception of the results of the operation of the computer and the commands which are entered by the operator.

On the display it is possible to obtain any information which is contained in the memory of the computer, for example, to scan pages of text and to observe the behavior of a component under a load and the flight of an aircraft which has not yet been produced in metal. The computer will plot the course of a ship, will give a reminder of a coming conference, and will do a large amount of other useful work. In the near future it has to assimilate hundreds and

thousands of new specialties, among them to learn to understand human language.

[Question] Electronics is penetrating all the spheres of the life and activity of people. What measures are necessary for the acceleration of this process?

[Answer] This question requires a broad answer, and I will only touch upon individual aspects of it.

First, the significant strengthening of our material base and the production of modern advanced computer devices from personal computers and minicomputers to large-capacity computers (supercomputers) are necessary. In 4 years of the five-year plan 1,828 plant technical management automation systems were put into operation. The increase of the technical level of production, which was obtained on this basis, made it possible in 1983 alone to save the labor of more than 600,000 people. And still this is obviously not enough.

In the draft of the Basic Directions of USSR Economic and Social Development for 1986-1990 and the Period to 2000 it is envisaged to ensure the increase of the volume of production of computer hardware by 2- to 2.3-fold and to increase rapidly the scale of the use of advanced high-performance computers of all classes.

Another problem is the insufficiently effective (to put it mildly) use of the already existing computer hardware at planning, design, and scientific organizations, which is connected, apparently, with the poor professional training of the users of computers of the broad type. It should be noted that the effectiveness of the use of the means and methods of information science greatly depends on the programs which carry out the interaction of man with the computer. They are significantly more expensive than the hardware portion of computers.

It is quite obvious that the graduates of secondary schools, tekhnikums, and vocational and technical schools, not to mention specialists with a higher education, should master (of course, to different extents) the principles of information science and computer technology, which will help them first to get their bearings, and then to "manage" large arrays of information. The school reform and the revision of the curricula at higher educational institutions should play a decisive role here. People should not be afraid of computers. They should treat them as their close assistants. It is necessary, on the one hand, to stimulate in every way "electronic" games among children and, on the other, to set up an extensive network for the retraining of already working specialists. This is a dictate of the times.

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REGIONAL ISSUES

ROLE OF UZBEK SCIENTISTS IN SCIENTIFIC, TECHNICAL PROGRESS

Tashkent EKONOMIKA I ZHIZN in Russian No 9, Sep 85 pp 37-43

[Article by President of the Uzbek SSR Academy of Sciences P. Khabibullayev under the rubric "Science and Technology": "The Accountability of the Scientist Is Great"]

[Text] Scientific and technical progress today is the most reliable means of increasing production efficiency. Not without reason was it called at the April CPSU Central Committee Plenum "a strategic lever of the intensification of the national economy." All the spheres of production and the entire system of economic management have to be reorganized on the basis of the latest achievements of science and technology. This governs the high level of responsibility and the importance of the tasks which are being assigned by the requirements of the times to the workers of science.

In Uzbekistan a comprehensive program of scientific and technical progress and its socioeconomic consequences to 2005 has been formulated. This program as a preplanning document envisages the mobilization of the scientific forces of the republic for the solution of the most important national economic problems in the closest contact with ministries, departments, and enterprises.

The Uzbek SSR Academy of Sciences is the coordinating center of scientific research in the republic. The 37 scientific research institutions, 7 design bureaus, 2 pilot plants, and the Kibernetika Scientific Production Association unite more than 16,000 associates, including 4,100 scientists. This is a mighty army which has enormous possibilities for the application of its forces in the leading directions of science.

The present scientific and technical revolution involves the changeover to automated labor in production, and precisely automation in many ways determines the social consequences of this revolution, freeing man from difficult manual labor. Hence follows the main direction of the labor-saving scientific and technical policy--mechanization and automation.

It is a question of the extensive introduction in all the sectors of the national economy of computer technology, microprocessors, electronics, robotic complexes, and flexible machine systems. The promise of this direction stems

from the need for the substantial increase of labor productivity and from the qualitatively new change of the economic level of production.

The academic institutes are conducting research which is connected with the development and introduction of plant technical management automation systems. Such systems are already in operation at enterprises of petroleum refining, petrochemistry, and machine building and at the Amalyk Mining and Metallurgical Combine. A simulation system of the control of robotized technical complexes with the use of computers has been introduced at the plants of the Soyuzmashkhlopkovodstvo All-Union Association.

During the years of the 11th Five-Year Plan more than 530 units of automatic manipulators and robots should have been introduced. However, the fulfillment of this program is in danger of being upset. At present less than 100 robotic devices are in operation at the industrial enterprises of Uzbekistan.

On the one hand, the inertia and lack of foresight of several of our managers of organizations and enterprises are probably having an effect here. After all, the introduction of automated control systems, plant technical management automation systems, and robotics requires some trouble and material expenditures. At the same time this work does not always yield an immediate return. Here are just two examples of such a lack of foresight. The set of problems of the automated system of management and designing, which was developed for the Ministry of Installation and Special Construction Work, was not used even after complete approval by the commission of the client, while the system of the registration and monitoring of the operation of motor transport (an annual economic impact of 163,000 rubles), which was turned over to Garage No 8 of Uzavtotrans, operated for only 3 months. These are merely individual cases which characterize the overall state of affairs.

On the other hand, the level of the introduction of systems of the automation of research at the scientific organizations and institutions themselves of the Academy of Sciences is still low. What kind of example are we giving to managers? It is necessary, apparently, to begin the cardinal solution of the problems of automation with the establishment of order in our own "house"--at the Academy of Sciences.

The times urgently require: to change over from the development of individual automatically controlled machines to automated systems, shops, and completely automated enterprises, to make them a genuine laboratory of new equipment and advanced know-how.

The elaboration of the problems of power engineering in the broadest sense of this concept should be grouped with the directions, which to a significant degree govern at the present moment the social and technical progress of society and form the economic potential of the state. The increasing shortage of energy resources governs the importance of the concentration of the efforts of scientists on research in the area of energy-saving policy and the efficient use of fuel--the development of energy-saving technologies, the decrease of losses in lines of high-voltage transmissions of high and superhigh tension, the decrease of the "peak" loads at the energy-consuming enterprises of a number of sectors of industry.

In order to meet the increasing needs of the republic for energy raw materials by means of its own resources, highly efficient physical chemical methods of stimulating petroleum formations have to be developed and introduced, new methods of production, which make it possible to increase the well production rate and the degree of extraction of gas and gas condensate from the depths, have to be used extensively.

The studies of renewable sources of energy--solar energy, wind power, the energy of small rivers--hold a significant place in the solution of the problems of offsetting the depletion of natural resources in the republic.

A schematic diagram of the connection of the system of solar hot water supply to standard heating systems has been submitted to the Uzbek SSR State Committee for Construction Affairs. The Solntse Scientific Production Complex is being readied for placement into operation. And still we should frankly admit: the level of the developments, which are connected with the use of solar energy, for the present still obviously lag behind the needs of the national economy of the republic.

The development of the fuel and energy complex is most closely connected with the broadening of the fuel and raw material base. The successful accomplishment of this task depends on the rapid development and increase of the efficiency of basic and applied geological scientific research, first of all that research which decisively influences the improvement of the forecasts, methods, and technique of the prospecting, exploration, and economic evaluation of deposits.

It is possible to group with the significant achievements of geology scientists the discoveries of deposits of new nonstandard types of mineral raw materials--rare alkali elements. A number of metallogenic forecasting and geophysical maps, maps of magnetic complexes and their ore content have been made for individual regions of Uzbekistan and Central Asia. These maps are being used in prospecting, evaluation, and exploration operations. For the study of the abysmal structure of the earth's crust powerful excitation sources and laser systems are being developed at the Uzbek SSR Academy of Sciences jointly with the Institute of High Temperatures of the USSR Academy of Sciences. Work is being continued on the forecasting of earthquakes, the establishment of seismic macroregions and microregions, and the seismic stability of structures on the basis of the laws of the propagation of seismic waves in different terrestrial rocks. The developments of our seismologists are being introduced successfully in Vietnam, India, Mozambique, Angola, and other countries.

We undoubtedly have achievements in this area. But the work on the geological study of the territory of the republic today should be accelerated significantly. The time has come to reject the old traditional methods of prospecting deposits of minerals and to develop a theory of their genesis, which is based on the detection and prospecting of nonstandard types of deposits of mineral raw materials. It is necessary to use more extensively the methods of space geology and to improve constantly the organization of the work of geological expeditions and the methods and technique of the prospecting, exploration, and economic evaluation of deposits.

One of the most important economic and social problems today is the utmost intensification of agriculture. Speaking at the republic conference of agricultural workers, First Secretary of the Uzbek CP Central Committee I.B. Usmankhodzhayev noted: "We are living in a period, when a scientific and technical revolution is occurring in all the sectors of the national economy. Agriculture and cotton growing in particular should not be left aside." If only the following fact testifies to the scale and effectiveness of scientific research in this area: more than 50 percent of the area under crop in the republic has been sown with seeds of strains of cotton, which were developed by scientists of our academy. In the past 5 years alone about 30 new strains have been developed. The annual economic impact in the national economy from their use comes to about 300 million rubles.

Effective agricultural techniques of cultivating cotton, methods of its protection against pests and diseases, highly efficient defoliants, growth stimulants, and compound fertilizers, which are being produced in accordance with the technologies which were developed by scientists of the Uzbek SSR Academy of Sciences, have been developed and are being introduced. A sectional self-cleaning spindle has been assimilated in production and is being used in the production of cotton pickers.

The Institute of Experimental Plant Biology proposed a new system of farming, which is aimed at the radical improvement of the fertility of soil--by its deep cultivation. It makes it possible to increase the yield of cotton by 20-25 percent and fodders by 40-60 percent. Its use on an area of 31,000 hectares yielded an economic impact of 8.6 million rubles a year. Now the task of scientists is to expand significantly the experience of introducing this advanced system in various agricultural zones of the republic.

More correctly speaking, this is only one of the facets of a multidimensional task--the identification and use of the reserves of the intensification of agricultural production. Can we really assert that the present strains fully meet the requirements of agriculture and industry? The existing cotton pickers are also extremely imperfect. They not only do not ensure the timely and complete harvesting of the crop of raw cotton, but also worsen its quality. Here it must be frankly said that the lack of good machines, which has the result that the countryside has to resort to the assistance of city dwellers and, in particular, students and school children in the harvest--all this to a significant degree is on the conscience of our scientists, and we cannot but sense here our own responsibility.

It is well-known that the supply with water resources is of decisive importance for the development of agriculture and the entire agroindustrial complex. The role of science in the accomplishment of this socioeconomic task of enormous importance was emphasized at the October (1984) CPSU Central Committee Plenum and the 18th Uzbek CP Central Committee Plenum, which outlined a program of creative work on the increase of the yield of the irrigated hectare.

Scientists of the Academy of Sciences gave a socioeconomic substantiation of the set of measures, which are aimed at the efficient use of water resources,

the diversion of a portion of the run-off of Siberian rivers, and the moderation of the processes of the anthropogenic transformation of the Aral Sea area into a desert.

The complex problems of geophysics and hydrodynamics, the automation of water distribution and water consumption, the renovation and modernization of all irrigation networks with the use of a system of more advanced earth-moving machines, as well as the problems of the development of an economic mechanism, which stimulates the economical and efficient use of water resources in the republic, have to be solved.

The policy of the utmost saving of natural and material resources is a characteristic trait of the times. In our times precisely saving is becoming one of the most important sources of the increase of production.

Unfortunately, it must be said that the work on the use of secondary resources is not yet of a large-scale nature and is being performed without the proper initiative and enterprise. More than 5 million tons of phosphogypsum, which could become an inexhaustible store for the construction industry and cement production, are hauled annually to the dumps of the Amalyk, Samarkand, and Novo-Kokandskiy Chemical Plants. More than 60 million tons of secondary kaolins--a most valuable raw material for many sectors of industry--have been accumulated in the dumps at the Angren coal deposit. The ash and cinder waste of thermoelectric power plants is not being used in the production of industrial construction materials. The waste of industry and agriculture, as well as municipal and household waste in practice are not being used for the production of organic fertilizers and the replenishment of the shortage of fuel resources.

Here it is necessary to note that scientists of the republic have proposed many interesting plans on the maximum use of secondary resources. In particular, recommendations have been drawn up on the use of wollastonites, the low-waste extraction of the sulfide and tungsten ores of the Koytash deposit, the associated recovery of impurity elements from molybdenum and pyrite concentrates, the obtaining of lead and zinc concentrates from the ores of the copper and molybdenum deposits of the Amalyk mining region.

But so far it has not been possible to fully utilize the developments of scientists. The reason is still the same--departmental isolation, the reluctance of some managers of economic organizations to go a bit farther than the plan instructions.

As a result the republic and the country are losing irreversibly enormous natural material resources and are not using the so substantial possibilities of increasing the efficiency of social production.

I will cite a specific example. The academic institutes back in 1970 developed a technology of the use in the agroindustrial complex of the waste products of biochemical plants--lignin. The introduction of this technology on the scale of the republic would have made it possible to increase the fertility of 30,000 hectares of land and to obtain by the increase of the yield of agricultural crops an income of 5-7 million rubles. In this case

ecological problems would have also been effectively solved. Unfortunately, more than 10 years passed before in 1981-1982 it was possible to achieve the inclusion of this development in the plans of introduction of the republic Ministry of Agriculture. But the plan in this area was never fulfilled. The active intervention of party organs and the Tashkent Scientific Center was needed in order for the use of ammoniated lignin in the amount of 150 tons on 15 hectares--instead of 15,000 hectares according to the plan--at 3 farms of Yangiyulskiy Rayon to be organized. In 1984 this valuable organic mineral fertilizer was already used on 145 hectares. The obtained results completely confirmed the importance of this scientific development. But, as we see, a long 15 years passed from the origination of the idea to its implementation.

But the evaluation of the activity of scientific institutions in the end is determined precisely by the results of the introduction of completed developments in the practice of economic development.

The problem of the interaction of science with production remains today one of the most urgent ones. As the above-cited example with the use of lignin attests, the period of the introduction of the recommendations of scientists in production at times is dragged out for long years. And, unfortunately, there are many such "pieces of evidence." Suffice it to say that about half of the scientific developments are not used at all in production. Frequently the results of completed research and development are introduced on an inadequate scale--only at individual enterprises and isolated farms.

A large share of the blame here rests with the scientific institutions themselves. Many recommendations are not formulated specifically enough, the possibilities of production and the conditions of implementation are not taken into account, they do not undergo tests under experimental conditions and in a production experiment, and duplicate each other.

On the other hand, simply the passivity of some economic managers and the underestimation by them of the need for the quickest use of the results of the latest scientific achievements frequently stand in the way of a scientific development, as is customary to say, from the laboratory to the shop.

As an example I will recall the story with chlorella, the problems of the use of which the journal EKONOMIKA I ZHIZN raised more than once. A little more than 15 years ago the Institute of Microbiology gave recommendations on the use of chlorella in animal husbandry. The Institute of Economics determined the efficiency of their introduction. Used just at the Rassvet Farm of Tashkent Oblast, this development yielded in 1984 a net profit of 1.19 million rubles. It seemed that under the conditions of the acute shortage of fodders its importance is obvious. Nevertheless the organizations of the Uzbek SSR Ministry of Agriculture are not in a hurry to use it on a more extensive scale.

We are saying much about the need for cardinal changes in the established practice of introducing scientific and technical developments. However, so far the basic levers of the regulation of the interaction of science and production have not been found, the mechanism of the transfer of developments

to introduction has not been developed, a direct interest in this matter on the part of production workers is not evident.

Evidence of this is the inexplicable slowness in the establishment of intersectorial laboratories, which could play an effective role as an intermediate introducing unit. Today in the system of the Academy of Sciences there are 13 such laboratories. The establishment of another 17 is envisaged by party decisions. However, only one was organized. The ministries of geology, light industry, power, and others did not consider it necessary to fulfill this decision.

The conducting of research in accordance with supply orders of ministries and departments could shorten the path from the idea to introduction. In these orders the ministries and departments could reflect their most urgent problems and obtain scientific recommendations which meet the interests of their production. However, this practice, which has justified itself in other republics, has not received extensive dissemination here due to the fact that the ministries are not allocating the necessary assets and limits on labor and wages.

Serious thought should also be given to the improvement of the practice of work on the basis of economic contracts, which are frequently minor and are concluded for a short term.

For the testing of the scientific developments of institutes of the natural science and technical type it is necessary to improve the work of the experimental design technological bureaus, to provide them with a technical base and special personnel, and to improve the organization of their management.

The problem of the efficient combination of applied and basic research is one of the main ones today. The present conditions require of us bold, revolutionary discoveries and scientific decisions, which it is impossible to do without a solid theoretical base.

It should be constantly recalled that the disregard or the underestimation of the importance of basic research makes itself felt significantly very quickly--in 8-10 years. I will cite an example.

At one time, when the Central Asian Scientific Research Institute of Irrigation was established, it was proposed that the procedural supervision of theoretical developments on questions of reclamation and irrigation should be carried out by the Academy of Sciences. However, in recent times the academy has not dealt with this question, while such "noninterference," apparently, suited the management of the sectorial institute. The collectives of the institute conducted theoretical research only within the framework of the applied tasks, which the Ministry of Water Resources had posed for it. As a result now, when the republic is experiencing a shortage of water resources, when global problems, which are connected with the unique diversion of a portion of the run-off of Siberian rivers to Central Asia, are being solved, we do not have a serious fundamental scientific base, which makes it possible

to solve in the future the enormous practical problems in the area of reclamation and irrigation.

"It is necessary to attach priority importance," Comrade M.S. Gorbachev said at the conference in the CPSU Central Committee, which was devoted to questions of the acceleration of scientific and technical progress, "to the development of fundamental science. Precisely it acts as the generator of ideas, makes breakthroughs into new areas, and provides outlets to a new level of efficiency."

It must be stated frankly that at present in the republic intensive basic work is absent in molecular electronics, genetic and cellular engineering, physical biological radiochemistry, adaptive robotics, information science, and a number of other fields, which determine the main directions of the development of modern science. Only in case of the leading development of basic research and its high qualitative level, which affords the opportunity for the conducting on this basis of applied development--only in case of such an approach will our science be able to hold leading positions in the most important directions of scientific and technical progress.

In this connection it seems necessary to intensify the specialization of institutes. There should be specified for each of our institutes one or two main scientific directions, on the development of which it should concentrate all its scientific forces.

The successful development of science depends to a decisive degree on the skills and the ideological maturity of the people working in it--scientists. The decisions of the 16th Uzbek CP Central Committee Plenum, which adopted the fundamental policy of the improvement of the sociopolitical climate in the republic, were a mighty stimulus in the improvement of the work with personnel. Much is being done in this direction. And still it is regretfully necessary to state that not all our scientists for the present are completely complying with the present requirements and the high level of scientific knowledge, are not completely able to use the entire arsenal and methodology of scientific research, mathematical logic, and computer hardware, and do not have a knowledge of the achievements of domestic and world science.

We need a constant influx of fresh forces into science and the skillful combination of proven personnel of older generations with young, promising workers.

At present at the Uzbek SSR Academy of Sciences there are only 3 doctors of sciences under the age of 40. As compared with the beginning of the 11th Five-Year Plan the number of young people among scientists has decreased to nearly one-half, and they make up only 17 percent of the total number of scientists.

For many of our leading scientists, academicians, corresponding members, and doctors of sciences the establishment of their own scientific school and a personnel reserve of science has become a secondary matter. They are infrequent guests at student and school auditoriums and are not cultivating

among our young people a love for science and an interest in its problems. Precisely for this reason here in graduate studies matters are, mildly speaking, not as we would like. The average age of full-time graduate students is 29, correspondence graduate students--32.5. Of the 252 graduate students, who completed graduate studies in 1984, only 11 defended a dissertation, 57 people submitted a dissertation for defense. Thus, the efficiency of graduate studies came to 27 percent.

Today, not for the first time, we are forced to state that not always those people, whom we would like to see in them, are coming to graduate studies. And here is the result: the efficiency of graduation from graduate studies in the Earth Sciences Department in 1984 came to...0 percent. The Mechanics and Control Processes Department is in next to last place. Here the efficiency of graduate studies is equal to 11 percent. There are still many negative phenomena in the matter of supervising the seekers of degrees and graduate students. Of the total number of supervisors 40 percent are candidates of sciences, while many doctors of sciences do not have students. But only whoever has his own recognized school can be considered a real scientist.

Of the 274 doctors of sciences of our academy 39 at present are not taking part in the training of personnel--seekers of degrees and graduate students. Among them are academicians and corresponding members. Many supervise students formally and do not give them the necessary scientific and procedural assistance. In all 27 doctors of sciences have not trained at all a single candidate of sciences.

It seems to me that the training of personnel along with the efficiency of scientific production work should become a basic evaluation indicator of the activity of institutes. These are two aspects of the unified process of the movement of science.

In this connection one should group with the urgent problems the improvement of the activity of competition commissions and the elimination of the negative phenomena which exist in their work. It is necessary to put an end for good to the formal attitude toward this most important matter. Judge for yourself. More than 50 percent of the chiefs of sectors and laboratories are candidates of sciences. The average age of this category of workers is 51, only 9 percent of them are female scientists. One manager of a laboratory or sector in five has been in this position for more than two elected terms. There are chiefs, who have held these positions for nearly a quarter of a century, but have never defended doctoral dissertations.

Stagnation and conservatism in personnel questions lead to the marking of time in scientific research. It is necessary to resolutely do away with this practice.

It must not be allowed that an entire institute exists at the expense of individual laboratories and divisions, which work well. That is why it is necessary to eliminate resolutely unproductive scientific subdivisions and to take the most rigorous steps against those scientists, who, "having received a degree," give science and practice hardly anything and continue to work on the same theme, by masking it with other names.

The intensification of the work on the tightening up of party, state, and labor discipline at all levels of the management of science is a task of prime importance. Here we must constantly recall the words of Comrade M.S. Gorbachev that "we will support, stimulate, and elevate in every possible way those who not by words, but by deeds and practical results display their own honest and conscientious attitude toward the fulfillment of their social duty. We will fight against any displays of ostentation and idle talk, conceit and irresponsibility, against everything that is at variance with the socialist norms of life."

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REGIONAL ISSUES

KAZAKH ACADEMICIANS DISCUSS SCIENTIFIC, TECHNICAL PROGRESS

Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 3 Dec 85 pp 2-3

[Article by R. Nasyrov under the rubric "The Rostrum of the National Discussion": "Scientific and Technical Progress: The Achievements and Prospects of Acceleration. Republic Scientists Talk at a Round Table of KAZAKHSTANSKAYA PRAVDA"; first paragraph is KAZAKHSTANSKAYA PRAVDA introduction]

[Text] Academician A.M. Kunayev, president of the Kazakh SSR Academy of Sciences; Vice President and Academician of the Kazakh SSR Academy of Sciences Ye.V. Gvozdev, director of the Institute of Zoology; Vice President and Academician of the Kazakh SSR Academy of Sciences Sh.Sh. Ibragimov, director of the Institute of Nuclear Physics; Vice President and Academician of the Kazakh SSR Academy of Sciences S.M. Kozhakhmetov; Academician of the Kazakh SSR Academy of Sciences N.K. Nadirov, chief scientific secretary of the Presidium of the Academy of Sciences; Academician of the Kazakh SSR Academy of Sciences U.M. Sultangazin, academician-secretary of the Physical and Mathematical Sciences Department, director of the Institute of Mathematics and Mechanics; Academician of the Kazakh SSR Academy of Sciences Zh.S. Yerzhanov, academician-secretary of the Earth Sciences Department, director of the Institute of Seismology; Academician of the Kazakh SSR Academy of Sciences B.A. Zhubanov, academician-secretary of the Chemical and Technological Sciences Department, director of the Institute of Chemical Sciences; Academician of the Kazakh SSR Academy of Sciences A.N. Ilyaletdinov, academician-secretary of the Biological Sciences Department, director of the Institute of Microbiology and Virology; Academician of the Kazakh SSR Academy of Sciences T.A. Ashimbayev, director of the Institute of Economics.

[Question] At the present stage of development the party is posing the task of making a broad breach along the entire front of scientific and technical progress and of doubling by 2000 the production potential of the country. What has been done in this direction by scientists of Kazakhstan?

A. Kunayev: The discussion of the draft of the new version of the CPSU Program and the draft of the Basic Directions of USSR Economic and Social Development for 1986-1990 and the Period to 2000 has become truly national. The attention of scientists has also been attracted to these most important precongress documents. They are studying with profound interest those

provisions, in which the need for the acceleration of scientific and technical progress and the priority tasks of science on the development of the productive forces and the changeover of the economy to the path of intensification are discussed.

The republic Academy of Sciences is performing much work on the development of promising basic and applied research, the increase of its efficiency, the concentration of forces and assets on the solution of important problems, and the strengthening of the creative contacts of science with production.

The network of scientific institutions of the academy has undergone definite development--during the 11th Five-Year Plan alone four institutes and the Central Kazakhstan Department in Karaganda were organized. The expansion of the network of scientific research institutes and scientific centers of the Kazakh SSR Academy of Sciences is also envisaged during the 12th Five-Year Plan in the major regions of the republic.

The scientists of Kazakhstan are conducting research on a broad range of problems, which are urgent for the republic, and in a number of directions hold a leading place in the country. The development of the fundamental principles of metallogeny, mining, metallurgical processes, applied mathematics, radiation physics, catalysis, chemistry, molecular biology, and biochemistry is the most important scientific direction, which is significantly influencing scientific and technical progress in individual sectors of the national economy.

Appreciable gains exist in the area of the introduction of the achievements of science in production. During the current five-year plan alone 775 works have been introduced, the economic impact from their implementation came to 340 million rubles. About 2,000 certificates of authorship and 45 patents of foreign countries have been issued for our developments. The academy has 11 license agreements and contracts with such countries as the FRG, Japan, Australia, Italy, Spain, Bolivia, Belgium, Mexico, the GDR, Yugoslavia, Hungary, and others.

We will henceforth improve the forms of the planning and integration of science and production, will develop the priority directions of basic and applied research, and will intensify research by the introduction of computer technology and the provision of laboratories with modern equipment and instruments.

[Question] How are the problems of the coordination of research being solved in light of the new tasks?

N. Nadirov: Based on the fact that science at the present stage of its development cannot make a decision with few forces and assets, it requires efficient coordination and integration. The Academy of Sciences is devoting particular attention to the further development of joint research with ministries and departments and to the extensive use of the goal program method in the planning of scientific research in the most important directions.

Scientific councils are one of the organizational forms of the coordination of the research of various departments in the field of the natural and social sciences. A leading role belongs to them in determining the promising directions of research. Great importance is being attached to the role of the scientific councils in formulating scientific and technical problems and to the monitoring of their implementation. The academy has been specified for the 12th Five-Year Plan as the main organization for 11 republic comprehensive programs which are aimed at the acceleration of scientific and technical progress in the national economy of Kazakhstan.

The Intensification-90 Program, which includes 57 operations, is serving the tasks of coordinating scientific research work with the plan of the economic and social development of the republic. In all 20 institutes, the efforts of which will be aimed at the development and introduction of more advanced equipment and technology, new types of materials, products, items, means of automation and mechanization, and computer technology, are being enlisted in the implementation of the program.

[Question] What is being done for the strengthening of the creative ties of science with production and for the introduction of its recommendations in practice?

S. Kozhakhmetov: In recent times the preferential development of the most urgent directions of the basic sciences and the speeding up of the time of the introduction of their results in practice has become especially noticeable. The Department of the Introduction of the Results of Scientific Research Work, the activity of which made it possible to broaden and extend significantly the contacts with many sectorial ministries of the republic, has been set up within the central staff of the presidium. An interdepartmental council for the coordination of scientific research in the field of ferrous and nonferrous metallurgy, chemistry, geology, mining, in the agroindustrial complex, and in the social sciences has been established in Karaganda on the basis of the Central Kazakhstan Department of the Kazakh SSR Academy of Sciences.

At the same time we are far from complacency. The existence of a number of unimplemented highly efficient developments obliges us to seek new forms of the contact of academic science with production. It is proposed, in particular, on the basis of a number of academic institutes, planning and design subdivisions of the Ministry of Nonferrous Metallurgy, and livestock sovkhozes of the Kazakh SSR Ministry of Agriculture to establish three independent scientific and technical complexes--Mining, Nonferrous Metallurgy, and Selection.

[Question] The prospects of the development of heavy industry of Kazakhstan first of all are determined by the natural resources of its depths. The efficient use of mineral resources is becoming a most important national economic task. What that is new has appeared in the earth sciences?

Zh. Yerzhanov: During the current five-year plan scientists of the Earth Sciences Department have performed a number of major operations which are of great theoretical and practical importance. A general theory of the rotation of the earth was developed by works of the Institute of Seismology. Answers

to key questions of earthquake mechanics were found. A map-diagram of the sites of the possible occurrence of strong earthquakes in the southeastern part of Kazakhstan in the next 10 years was compiled in accordance with a set of geological and geophysical materials. A new method of division into seismic microregions was developed and a seismic map of Alma-Ata and the suburbs, which was included in the catalog of the basic republic construction norms, was compiled on its basis.

For the series of works "The Metallogeny of Kazakhstan and Complex Studies of the Most Important Mining Regions" a large group of scientists of the Order of Labor Red Banner Institute of Geological Sciences imeni K.I. Satpayev was awarded the 1985 USSR State Prize. It can be safely said that these operations, which have been reduced to an 11-volume work and are provided with maps of the magmatic complexes of the paleozoids of Kazakhstan and structural formation and relief maps of metallogenic complexes, will serve as the fundamental basis of the planning of research work for a lengthy period.

In a number of directions of science the institute, figuratively speaking, is taking unbeaten paths. Thus, a test run of a pure isotope of one of the rare elements was obtained for the first time and flow charts of its commercial production were proposed.

The diesel and pneumatic drives of drilling, loading, and transport self-propelled mining machines are complicating significantly the work under underground conditions. The collective of the Institute of Mining in recent years has advanced far in the solution of this problem. In particular, experimental models of an electromagnetic perforator and a battery-powered trolley dumper were developed. Their tests under production conditions yielded very positive results. A fundamentally new flow technology of the excavation of ore deposits was proposed on this basis.

The works of the Institute of Hydrogeology and Hydrophysics are of great practical importance. At present a forecast of the change of the hydrogeological conditions in the basin of Lake Balkhash has been issued by it. The degree of the dependable water supply of the territory of the republic with ground waters and the scale of their possible use for irrigated farming have been determined. The recommendations of the institute served as the basis for the establishment of large tracts irrigated with ground waters at the Pavlodar 30 let Kazakhskoy SSR Kolkhoz and the Semirechensk 40 let Oktyabrya Kolkhoz and Oktyabrskiy Sovkhoz. Testing grounds and areas for long-term continuous hydrogeological observations are now being organized there.

The decrease of the level of the Aral Sea and the turning of the Aral Sea region into a desert are a fact which you will not escape. The ecological and socioeconomic processes, which are due to this fact, have been studied for a long time at the Institute of Geography. All-encompassing recommendations on the alleviation of the negative consequences, of which the drying up of the Aral Sea is the cause, have now been prepared. Recommendations on the efficient use of the natural resources of the small lakes of Kazakhstan, water and land resources, and the intensive development of the productive forces of the Ili-Balkhash basin have also been drawn up. Methods of predicting the

danger of mud flows in the mountainous regions of Kazakhstan, which are being successfully used in practice, have been turned over to the Kazglavselezashchita.

[Question] Chemistry under present conditions is one of the successful fields of knowledge. What has the work of the scientists of the Chemical and Technological Sciences Department given the national economy of Kazakhstan?

B. Zhubanov: If the question is posed that way, I will immediately state the answer--245 million rubles. Such is the economic impact which was obtained from the introduction of the scientific developments which were proposed by scientists of the department during this five-year plan alone. We are willingly agreeing to the development of such advanced forms of contact as the joint formulation with allied sciences of scientific and technical comprehensive goal programs and the coordination of scientific plans with sectorial ministries of the country and the republic. Here particular attention is being devoted to the introduction of the results of scientific research work in practice.

The complete processing of phosphate-silicide raw materials, the autogenous smelting of copper raw materials, the study of the processes of the complete processing of aluminosilicate and titaniferous raw materials, the assimilation and production of ferrophosphorus of improved quality, and the development and improvement of advanced hydrometallurgical means of obtaining compounds of rare metals are among the most significant developments which are being carried out by the Institute of Metallurgy and Ore Dressing.

The development of flow charts of the use of secondary raw materials holds an important place in the work of the institute. The introduction of new technologies for the processing of the industrial products of lead production and scrap batteries is making it possible not only to increase the efficiency of the production of lead and its alloys, but also to improve significantly the quality of the final product.

The 22d All-Union Conference on High Molecular Compounds was recently held with great success in the capital of the republic. Not by chance did Alma-Ata become the site of such a meeting. In recent years many urgent problems of polymer chemistry have been intensively elaborated here. Significant results were obtained in the study of the means of forming high molecular compounds and studying their properties and in the development of polymer items for various purposes. Here are several of them, which have received extensive appearance in practice.

The Kazakhstan section of the Novyy Uzen-Kuybyshev petroleum pipeline passes over highly mineralized soil. Bottom insulation did not save the steel pipes from corrosion. In 2-3, at the outside 5 years they had to be changed. Plastobit--a polymer film coating developed by the Institute of Chemical Sciences--ensures the reliable protection of pipes for 30-35 years, practically their entire service life. This coating is now being used in many other places.

The technology of obtaining fertilizers in the form of polymer phosphates, which was proposed by the institute, does not have analogues in world practice. This intensive technology makes it possible to commit to processing even the leanest ores which were previously dumped. But what is especially valuable, polyphosphate fertilizers far surpass in their effect on the formation of the crop all fertilizers of such a type. The new regulators of the growth of agricultural crops are making it possible to increase by many fold the volumes of the productive mass in the harvests of sugar beets, corn, and potatoes. The nutrient cellulose, which is being developed in accordance with the technology of the institute, in its food value is comparable to alfalfa hay.

It is possible to continue the list of such developments. But, if we summarize all this, it should be emphasized that the basic scientific directions, which are closely connected with the development of both modern chemical science and the national economy of the republic, have been formed at the institute.

The developments of the Institute of Organic Catalysis and Electrochemistry are being used extensively for the obtaining of high-quality fats, perfumes, medicines, and vitamins and the purification of industrial, transportation, and technological gases. The production of ultrapure metals was assimilated in accordance with the technologies of the institute. The highly efficient Lepestok-V respirator for the protection of the respiratory organs against the toxic acids of gaseous substances has found extensive application.

The need for the quickest development of the Karachaganak gas condensate deposit in Western Kazakhstan is indicated in the draft of the Basic Directions. For the purpose of solving this problem the Institute of Petroleum and Natural Salts Chemistry made a comprehensive study of the physical chemical properties and hydrocarbon composition of the petroleums of the deposit. An effective neutralizer of hydrogen sulfide, which is compatible with various types of drilling muds, was developed.

The petroleums of Mangyshlak are distinguished by a high structural viscosity. This creates difficulties during their transportation through pipes to the sites of refining. These difficulties proved to be especially significant when developing the petroleums of the Buzachi anticline. The careful study of such a complex process as the flowing of viscous fluids in pipelines was required. The results of the study were used at the construction site of the Kalamkas-Karazhanbas-Shevchenko petroleum pipeline system. The fundamentally new approach was made the basis for the method of transporting petroleum. This made it possible to save on transportation alone tens of millions of rubles.

[Question] The first commercial fast nuclear reactor in the world has been operating successfully in Kazakhstan for more than 10 years. Reactors of this type have a great future. What problems are the scientists of the republic, particularly the scientists of your institute, working on for the development of atomic energy?

Sh. Ibragimov: Prior to the construction and placement into operation of the BN-350 nuclear reactor in Shevchenko, although important scientific and technical problems had been solved and the BR-2, BR-5, and BOR-60 experimental fast reactors had been developed by Soviet scientists and engineers, nevertheless, many important questions for reactors of a large unit capacity still remained unclear. Therefore, the collective of the BN-350 commercial reactor, which consists of highly skilled specialists (physicists, chemists, materials technologists, engineers, and process engineers), jointly with scientists of a number of scientific research institutes and planning organizations had to conduct extensive studies of the operation of the reactor and its units in various modes. Fundamental results for the development of fast power reactors have been obtained since the time of the start-up of the BN-350. The staff members of the Institute of Nuclear Physics have also made a definite contribution to the common cause. In particular, they have studied the structural composition and properties of the material of the fuel elements after their lengthy use under the operating conditions of the reactor. The point is that the materials of the core of modern nuclear reactors, especially fast reactors, in the process of use are exposed to radiation by a large flow of neutrons and, therefore, their vulnerability to radiation damage is becoming a serious problem. The lack of sufficiently radiation-proof materials to a significant degree can check the further development of nuclear and thermonuclear energy and can have an appreciable influence on the economy. Studies of the physics of the vulnerability to radiation damage and the changes of the properties of materials in case of radiation by a flow of neutrons and high-energy charged particles are being conducted along a broad front on this problem at the institute. The most radiation-proof alloy, which has been recommended as a construction material for the production of individual parts of the core of fast reactors and the first shell of the blanket of the future thermonuclear plant, was developed on the basis of the obtained data (jointly with the Leningrad Technological Scientific Research Institute). Fundamentally new results, which are of practical importance, were obtained during the study of the phenomena of the radiation embrittlement and the radiation creep of construction materials.

The process of nuclear fission is the basis for atomic energy. Scientists of the institute are also conducting priority research in this direction, and the obtained results are a qualitatively new contribution to the present understanding of the mechanism of nuclear fission.

Work in the area of the direct conversion of nuclear energy into electric power and the energy of laser radiation, as well as other research are being performed jointly with other organizations at the atomic reactor of the institute.

[Question] The works of Kazakhstan mathematicians in the field of algorithms, functional analysis, differential equations, and mathematical logic are quite well-known to specialists. But in addition to theoretical mathematics there is also applied mathematics, which is solving problems which are of practical importance. Tell us, please, about them. For example, about the TOPAZ system.

U. Sultangazin: First of all it is necessary to explain what is understood by the words "TOPAZ" and "system."

In this case there is meant by a system a set of programs for a computer, which interact with each other and the data bank; it is intended for the solution of a specific problem. TOPAZ is an abbreviation of the phrase "current objective forecast of atmospheric contaminants." The system should solve a number of problems, among which are the analysis of the existing situation, the appraisal of various air protection measures and projects, and so forth. The most difficult problem is reflected in the name of the system. In other words, our ultimate goal is to give a short-term forecast of air pollution, which is similar to a weather forecast.

What is the TOPAZ system yielding? So far we have not been able to make such a forecast as we would like. Much work still has to be done on this. But with the aid of TOPAZ in accordance with the order of the Alma-Ata State Institute for the Planning of Cities we are already now attempting to estimate the level of pollution of our city for various versions of its development. Several calculations have been obtained, and their results are of definite value. The overall adjustment of the initial version of the TOPAZ system, which is intended for use in elaborations of the technical and economic substantiation of the master plans of Alma-Ata to 2005, was carried out on the basis of these results. The system was put into pilot operation at the computer center of the Academy of Sciences.

The republic scientific and technical goal program on the improvement of the air basin of the city, of which, we hope, our system will also be one of the components, is now being approved. This will make it possible to unite the efforts of many organizations for the solution of the vital problem. And if, for example, in the morning newspapers the lines appear: "Today in the atmosphere of Alma-Ata there is expected..., the level of pollution with sulfur and nitric oxides is not greater than the maximum permissible...," we will regard the task, which has been posed for TOPAZ, to be accomplished.

Briefly about other works. A highly efficient algorithm of the numerical solution of the problem of the transfer of solar radiation in the planetary atmosphere on the basis of the method of spherical harmonics has been developed and implemented. Programs for the calculation of the irrigating capacity of a well, the water supply of irrigated areas, and the statistical processing of hydrogeological information have been turned over to the Kazakh State Planning, Surveying, and Scientific Research Institute of Water Management Construction.

An algorithm of the numerical modeling of the process of the cooling of wire on draw blocks was obtained. The work is of great practical importance for the Alma-Ata Plant of Heavy Machine Building.

[Question] Biotechnology has a great future. It is correctly said: its main discoveries are still ahead. But now, too, much has already been done. There probably is also something to tell Kazakhstan scientists.

A. Ilyaletdinov: The Institute of Microbiology is performing some work on the development of scientific research in the area of biotechnology and on the introduction of its achievements in the national economy. If we speak more specifically, this research is being conducted in a number of urgent scientific directions, the basic goal of which is the use of microorganisms and the products of their intermediate and intracellular exchange in medicine, agriculture, industry, the efficient use of natural resources, and the alleviation of the consequences of the harmful effect of the economic activity of man on the environment.

On this level the technology of the commercial production of dry bacterial ferments for the ensilage of fodders and their use during the laying in for winter storage of the green mass of corn, alfalfa, sainfoin, legume-cereal mixed grass crops, reeds, and straw has been developed. The ensilage of fodders with ferments makes it possible to increase the keeping capacity of protein by 25 percent, to increase the yield of fodder units by 15 percent, and to improve the edibility of fodders by 10-15 percent. The milk yields of the cows, which receive silage with ferments, increase, the gain of live weight in fattening increases. A kilogram of such a ferment gives the farm on the average a profit of 35 rubles. The bulk of the fodders, which are being laid in at farms for winter storage, is now being preserved with the use of ferments.

A new technology of producing nutrient yeast is being introduced extensively at the sovkhozes and kolkhozes of the republic. Their introduction in the diet of animals also contributes to the increase of productivity. Thus, at the Alma-Atinskiy and Dzhanasharskiy Sovkhozes, at which the start-up of yeast-growing plants has been carried out, milk production has increased on the average by 5 percent.

We drew up a recommendation on the use of the method of the presowing flooding of the rice field. The prevention of losses of soil nutrients and the intensive use of nitrogen by plants during the initial phase of development, which reduces their oxygen starvation and ensures the obtaining of thick shoots, are being achieved by this. At the Bakhbakhtinskiy and Tselinnyy Sovkhozes, at which the new method was used, the increase of the crop, which was obtained on 400 hectares, was valued at 100,000 rubles.

[Question] One of the noteworthy traditions of our zoological science is the interested approach to the solution of the urgent problems of agriculture and the use of nature. Kazakhstan zoologists are probably also adhering strictly to this tradition.

Ye. Gvozdev: Indeed, good traditions should be developed and supported in every way. We, in any case, are striving not to deviate from this rule. So that this assertion would not be unfounded, I will cite several examples.

The establishment of commercial livestock complexes and the concentration of a large population of livestock on a limited territory led to the emergence of a new parasitological situation at the farm. In case of inadequate attention to it this situation can get out of control and, having become uncontrollable, cause considerable troubles. We at the Institute of Zoology never let slip

from our field of vision the epizootological situation which has formed under the new conditions of the management of animal husbandry, are determining preventive measures, and are conveying them as recommendations to interested organizations for extensive use locally.

In the themes of the institute much attention is being devoted to the problems of worming, which is of great national economic importance. Up to now we have combated helminths, and more simply speaking parasitic worms of animals, with the aid of medicines. A new, extremely interesting means has now been determined: an attempt has been made to use biological compounds of predaceous fungi, which were made on the basis of wild strains against the helminths of animals under production conditions. The obtained materials have been turned over to managers.

The interests of zoologists and mathematicians come together in several directions of science. Thus, a mathematical model of the saiga population has been developed. On its basis, with the enlistment of rapid information on the number of these animals, recommendations on the annual norm of hunting are being drawn up. The use of this model in the shooting of saiga is making it possible to maintain the optimum level of the herd and to obtain a significant quantity of valuable food products and raw materials for industry. During the current five-year plan alone the Kazakh SSR Main Administration of Hunting and Game Preserves has bagged 894,600 saiga and has procured 13,652.4 tons of marketable meat. The total value of the products, including exports, came to 19.7 million rubles, while the net profit came to 11.7 million rubles. Other species of game are also being involved in hunting. In Eastern Kazakhstan, for example, in accordance with the recommendations drawn up at the institute the shooting of moose is being organized, work is being performed on the substantiation of the norms of the shooting of boars.

It is well-known that the number of muskrat in Kazakhstan in recent times has decreased significantly. We have conducted experiments on the cloning of muskrat, which also yielded good results during pilot industrial checking. In essence the promise of a new sector of fur farming--muskrat breeding--has been proven. All the grounds for the organization of a pilot industrial muskrat farm, at which at the same time as the obtaining of fur products it is possible to work out a number of questions of the cloning of the animal under production conditions, exist already now. However, the switching of the matter over to a practical basis is being greatly delayed. The completely unfounded, rigid position, it would seem, of the main interested party--the Main Administration for Trade in Furs of the Kazakh SSR Union of Consumers' Societies--became an obstacle to it.

The artificial breeding of the Semirechensk pheasant--an endemic animal of Kazakhstan--is of great practical interest. Contrary to the deep-rooted opinion about the impossibility of keeping it in captivity, ornithologists were able to prove that the Semirechensk pheasant is undemanding and breeds just as well as the game pheasant. The construction of the Talgar Pheasant Farm was begun several years ago. But so far it has not been completed, and the recommendations of scientists are not being implemented.

[Question] The Institute of Economics is the main organization for the formulation of the Comprehensive Program of Scientific and Technical Progress of the Kazakh SSR for 20 Years. What is this program?

T. Ashimbayev: The institute is a working organ of the Republic Scientific Council for Problems of Scientific, Technical, and Socioeconomic Forecasting attached to the Presidium of the Academy of Sciences and the Kazakh SSR State Planning Committee. In this capacity it coordinates the activity of more than 150 ministries, departments, scientific research institutes, higher educational institutions, and other institutions and organizations, which are performing work on one item of the program or another. The main document--"The Comprehensive Program of Scientific and Technical Progress of the Kazakh SSR for 1986-2005"--in 26 volumes was prepared jointly with the other performers. The basic directions of scientific and technical progress for the coming 20 years, which ensure the intensification of social production, the efficient use of manpower and mineral resources, the increase of the quality of work and on this basis the successful solution of social and economic problems, and the increase of the well-being of the people, are substantiated in it.

On the basis of the trends of socioeconomic development the growth rate and structure of social production are analyzed, the laws and the trend of reproduction processes for a long period and the prospects of the rapid development of science and technology, the creation of an even more powerful scientific and technical potential, and the integration of academic science, science of higher educational institutions, and sectorial science in the country are examined.

The most important problems of the development and distribution of the productive forces of individual regions of the republic are also examined in the program. In particular, the questions of the formation of the Pavlodar-Ekibastuz, Karatau-Dzhambul, and Mangyshlak territorial production complexes.

The Comprehensive Program of Scientific and Technical Progress of the Kazakh SSR is a scientific document which is intended for practical use during planning. Its materials were used extensively when preparing the draft of the Basic Directions of USSR Economic and Social Development for 1986-1990 and the Period to 2000, as well as when drawing up the master plan of the distribution of productive forces of the Kazakh SSR to the end of the 20th century. At present the institute is working on the compiling of the Comprehensive Program of Scientific and Technical Progress of the Kazakh SSR to 2010 and is completing the formulation of the Intensification-90 Program.

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REGIONAL ISSUES

ARMENIAN COMPUTER TECHNOLOGY, AUTOMATED CONTROL SYSTEMS

Yerevan KOMMUNIST in Russian 26 Nov 85 p 2

[Article by L. Nersesyan, chief of the Department of Computer Technology and Automated Control Systems of the Armenian SSR State Planning Committee: "Information Science Is a Subsector of the National Economy"; capitalized passages published in boldface]

[Text] In the draft of the new version of the Program of the Communist Party the questions of theory and practice are most closely united. Thereby the sections of the draft and its theses become clear, necessary, and addressed to each worker at his official labor post.

The requirements of the constant IMPROVEMENT OF THE MANAGEMENT OF THE NATIONAL ECONOMY and the reliable and efficient functioning of the economic mechanism, which includes diverse, flexible forms and methods, are a clear guide to action.

Serious changes should be made in the methodology and technology of the management of the national economy as a whole and its individual units at the regional level.

The further improvement of this process at present in practice is being accomplished by the improvement of the intradepartmental mechanism of planning and day-to-day management. For all its merits this method does not make it possible to settle jointly the questions of the further increase of the efficiency of social production by the strengthening of intersectorial and interdepartmental economic and management relations.

By their nature economic processes are of an intersectorial nature. The chain of links from production to consumption is subordinate to various departments, and their administrative actions are not always coordinated in time and are not always consistent from the point of view of the achievement of the end result.

For the purpose of strengthening the coordination of management functions when solving important comprehensive socioeconomic problems the corresponding commissions, which are intersectorial or subordinate organs of management, are being organized. The indicated commissions in practice settle questions of

day-to-day management, that is, tactical questions, on the basis of departmental strategic goals, here, as a rule, the optimum means of achieving the end national economic result fall from view.

ONE OF THE REASONS FOR THE LACK OF CONFORMITY BETWEEN THE FORM AND CONTENT OF THE PREVAILING MECHANISM OF THE MANAGEMENT OF THE ECONOMY OF THE REGION LIES IN THIS.

The elimination of such a contradiction requires the development and introduction of new, scientifically sound tools, which make it possible to submit to organs of territorial and sectorial management information on the comprehensive management of the national economy and its individual units with allowance made for interdepartmental and intersectorial relations.

The solution of this problem is seen in THE ESTABLISHMENT ON THE REGIONAL LEVEL OF AN INFORMATION PROCESSING INDUSTRY, THAT IS, THE ORGANIZATION OF A NEW SUBSECTOR OF THE NATIONAL ECONOMY--INFORMATION SCIENCE.

The more than 20 years of practical experience of using automated systems for various purposes in the sphere of management showed that, in spite of the annually increasing amounts of assets and resources, which are channeled into the establishment and industrial use of the named systems, the real return from their functioning, which is reflected in the final product, still remains unsatisfactory. But in the formed situation the software and hardware of the automated systems are not to blame, since their potentials are simply not being used. THE BASIC CAUSE OF THE INEFFICIENT USE OF COMPUTER EQUIPMENT IS CONNECTED WITH THE STRUCTURE AND METHODOLOGY OF MANAGEMENT, WHICH ARE BASED ON THE DEPARTMENTAL PRINCIPLE OF THE SOLUTION OF NATIONAL ECONOMIC PROBLEMS.

The departmental principle of the organization of automated systems and computer centers (subdivisions) created the linguistic, procedural, information, technical, and technological isolation and incompatibility of these systems, which is contributing to the even greater economic exclusiveness of ministries, enterprises, and organizations. Under such conditions the problems of the standardization of design approaches for their use in various sectors of the national economy cannot be solved. This leads to the increase of the cost of the formulation of planning and technical documents, the increase of operating costs, and the unprofitability of the operation of computer equipment and automated control systems. But the most important thing is that local information arrays, which are not coordinated with each other, are created in ministries, departments, enterprises, and organizations, which operate automated systems for various purposes.

All this in the end leads to the freezing of immense fixed capital for information processing and data transmission.

THE WAY OUT OF THIS SITUATION IS SEEN IN THE DEVELOPMENT OF COLLECTIVE FORMS OF THE INFORMATION AND COMPUTER SERVICE OF THE NATIONAL ECONOMY.

AT THE PRESENT STAGE OF THE DEVELOPMENT OF THE NATIONAL ECONOMY IT SEEMS NECESSARY TO ESTABLISH IN THE COUNTRY AN EFFECTIVE TESTING GROUND--A TEST ZONE, IN WHICH THE QUESTIONS OF THE INFORMATION AND COMPUTER SERVICE OF ORGANS

OF MANAGEMENT OF THE NATIONAL ECONOMY OF REPUBLICS WITHOUT AN OBLAST DIVISION, OBLASTS, ADMINISTRATIVE RAYONS, AND CITIES WILL BE ELABORATED ON A UNIFORM PROCEDURAL BASIS. The establishment in such a test zone of a standard regional infrastructure--the sector of information science--will make it possible to integrate the data processing and transmission systems on the all-union level.

The Armenian SSR, being the smallest union republic in territory, size of the population, the number of cities, the representativeness of the sectors of the national economy and industry, the level of industrial production, and its socioeconomic structure, is equal to many oblasts, krays, and republics.

The republic has a large industry for the production of computer hardware and electronic and communications equipment. Scientific production associations, enterprises, and planning and design organizations of the radio and electronics industry, instrument making, automation equipment, and control systems, the communications equipment industry, and others are located on its territory.

The professional level of the engineering and technical personnel and mathematicians is quite high, there is a relative surplus of manpower resources which are not involved in social production.

The pool of computers is representative. Practically all types of automated systems are operating on the territory of the republic, and at present work on increasing their functional possibilities is being carried out.

In the Armenian SSR the Telegraphic Message Switching Center, which operates on the basis of the Unified Computer System and which at present is interacting with similar centers of different regions of the country, was developed and introduced for the first time in our country.

At present more than 100 computer centers (subdivisions), which are equipped with modern computer hardware, are operating on the territory of the republic. Along with this the tendency for the number of computer centers to increase is continuing. This process is nearly irreversible, if one does not oppose to it a more economically advisable form of the organization of the information and computer service of all users, regardless of their departmental subordination.

Such characteristic features ARE MAKING IT POSSIBLE TO CONDUCT IN THE REPUBLIC AN EXPERIMENT ON THE ESTABLISHMENT OF A NEW SUBSECTOR OF THE NATIONAL ECONOMY--INFORMATION SCIENCE, WITH REFERENCE TO NEARLY THE ENTIRE TERRITORY OF OUR COUNTRY, MOREOVER, WITH FEWER EXPENDITURES AND IN A SHORT TIME.

THE REPUBLIC COLLECTIVE-USE COMPUTER SYSTEM, WHICH HAS BEEN ORGANIZED ON THE BASIS OF THE COMPUTER CENTERS OF SEVERAL MINISTRIES AND DEPARTMENTS OF THE ARMENIAN SSR AND THE COMPUTER NETWORK OF THE REPUBLIC CENTRAL STATISTICAL ADMINISTRATION, SHOULD BE THE TECHNICAL BASE of the proposed organization of information and computer service.

It is planned to encompass by automation the processing of social, technical, economic, financial, and credit information, all the national economic objects

which are located on the territory of the republic, regardless of departmental subordination. The bulk of the information and computer service of the named objects should be carried out by the computer network of the Armenian SSR Central Statistical Administration.

At present after the pilot operation of the standard package of applied programs, it will be turned over to the republic Central Statistical Administration and industrial enterprises for use.

Territorial and departmental data banks, on the basis of which it is planned to form intersectorial management complexes: "Industry," "Capital Construction," "The Agroindustrial Complex," "Material and Technical Supply," "Housing and Municipal Services," "Transportation," "Health Care and Social Security," "Environmental Protection," and others, will be organized.

The intersectorial management complexes should ensure the information and computer service of directive, departmental, and local organs of management.

STANDARD SOLUTIONS, WHICH ARE OF STATE LEGAL IMPORTANCE FOR THEIR EXTENSIVE INTRODUCTION IN THE NATIONAL ECONOMY OF THE COUNTRY, SHOULD BE TESTED IN THE TEST ZONE.

The proposed expenditures will be less than half as great as in case of the traditional means of introducing in the national economy the means of automated systems and computer hardware. For other regions of the country this impact is much greater, which the calculations submitted to the State Committee for Science and Technology by a number of union republics confirmed.

The draft of the basic provisions of the establishment of the test zone for the development of new methods of managing the national economy at the republic (oblast) level on the basis of the example of the Armenian SSR was submitted for consideration to all the councils of ministers of the union republics and to the leading ministries and departments of the USSR.

There are no objections on this question, there are specific suggestions on the procedure, the composition, and the structure of the test zone.

THE TASK OF ESTABLISHING A TEST ZONE IN THE ARMENIAN SSR IS ONE OF THE COMPONENTS OF THE SCIENTIFIC AND TECHNICAL COMPREHENSIVE GOAL PROGRAM WHICH IS AIMED AT INCREASING THE EFFICIENCY OF THE MANAGEMENT OF THE NATIONAL ECONOMY. Its implementation requires precise organization and great planning discipline in the scientific research, planning and design, and production collectives which are taking part in the establishment, introduction, and functioning of the test zone.

The solution of all these problems is aimed, as the draft of the Program requires, at increasing the contribution of each unit of the national economy to the achievement of the ultimate goal--the most complete meeting of the needs of society with the least expenditures of all types of resources.

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REGIONAL ISSUES

BOOK ON MANAGEMENT OF SCIENTIFIC, TECHNICAL PROGRESS IN REGION

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[Review by doctor of economic sciences Professor M. Timokhin (Moscow) of book "Mekhanizm upravleniya nauchno-tekhnicheskim progressom v regione" [The Mechanism of the Management of Scientific and Technical Progress in the Region] by N.N. Yermoshenko, "Naukova dumka", Kiev, 1985, 192 pages]

[Text] The principles, which were elaborated by the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress, require the serious analysis and the strengthening of all the links of the chain which unite science, technology, and production. This applies both to the entire national economy and to its component sectors and regions. Only sectorial systems of the management of scientific and technical progress are operating in the country. At the same time regional organs of state economic influence on the acceleration of scientific and technical progress are lacking. The monograph under review (Footnote 1) (N.N. Yermoshenko, "Mekhanizm upravleniya nauchno-tekhnicheskim progressom v regione" [The Mechanism of the Management of Scientific and Technical Progress in the Region], Kiev, "Naukova dumka", 1985, 192 pages) is also devoted precisely to the theoretical interpretation of this type of management from the political economic standpoint and from the standpoint of specific economic sciences. It was prepared at the Institute of Industrial Economics of the Ukrainian SSR Academy of Sciences and is the first serious scientific work on the formation of a mechanism of the management of scientific and technical progress on the regional level.

The author comes to the important conclusion that this type of management is objectively necessary under socialism. First, because it conforms to the criteria of the necessity of management in general, which were singled out by K. Marx. Second, the development of science and technology in the region, as the author notes, is the process of scientific and technical cooperation as a version of production cooperation and, therefore, is a component of the production relations which also need control action. Third, the effect of the law of the unity and struggle of opposites with respect to the management of scientific and technical progress will be realized fully only if one "opposite"--the sectorial system of the management of the development of science and technology--is supplemented by the second "opposite"--the

territorial aspect in the management of scientific and technical progress. And, of course, in the opinion of the author, this type of management is necessary by virtue of the effect under socialism of the principle of democratic centralism.

Laws, goals, principles, functions, methods, tools of influence, the organizational structure, personnel, equipment and technology, and the set of criteria of the evaluation of the effectiveness of management are the mechanism of the management of the development of science and technology on the regional level. Such an interpretation of the structure of the mechanism of the management of scientific and technical progress should be recognized as original.

All the components of the management of the development of science and technology in the region are examined with a sufficient degree of thoroughness in the monograph. The author devoted particular attention to the theoretical substantiation of the functional structure of this type of management and to the peculiarities of the implementation of the general principles and methods of socialism management in the process of the management of scientific and technical progress as the level of regions.

The analysis and theoretical generalization of the experience of the regional management of scientific and technical progress, which is available in the Ukrainian SSR and the country as a whole, enabled the author to propose a standard organizational structure of the system of the territorial management of the development of science and technology at the level of the ASSR, the kray, and the oblast, which consists of two subsystems: state economic influence and social influence.

Substantial space in the work was allotted to the use of the goal program approach to the management of scientific and technical progress on the regional level. Here the essence, principles, and functions of the goal program regional management of the development of science and technology were specified. The author substantiated the assumption that regional comprehensive programs of scientific and technical progress for a 20-year period and scientific and technical goal programs are the leading tools of this type of management. The methodological and scientific methods principles of the formulation and implementation of programs of this sort were elaborated or specified.

The peculiarities, essence, and methods of the territorial planning of the development of science and technology were studied in detail. Here the author correctly focuses attention on the fact that the territorial plan of scientific and technical progress is the basic lever of influence of local organs on the acceleration of scientific and technical progress. It is emphasized that goal programs and the territorial plan are the leading levers of the combination of the sectorial and territorial management of scientific and technical progress. The inclusion of the territorial plan of scientific and technical progress within the five-year plan of the economic and social development of the region as a section makes it possible to exert influence on the economy of the given territory and on the solution of a large number of social problems. In this connection the suggestions of the author on the use

of standards for the reflection of the results of scientific and technical progress in the plans of the economic and social development of regions, as well as the method of their elaboration are original.

The management of scientific and technical progress will be more efficient, if one masters the tools of its qualitative and quantitative evaluation. A set of criteria, on the basis of which it is possible to evaluate all forms of the regional management of scientific and technical progress--both those which already exist and those which are being planned--was elaborated for this during the study. One should also emphasize the practical orientation of the assumptions and recommendations, which are contained in the monograph and are aimed at the formation of systems of the management of scientific and technical progress in regions. The author analyzed extensive theoretical and procedural material (there are 232 sources in the bibliography), while this, in essence, is all the gained experience of the influencing of the development of science and technology on the part of local organs.

Along with the obvious substantial merits of this monograph there are several shortcomings in it. Thus, undoubtedly, the scientific boldness of the author should be present in the area of the attempt at a political economic analysis of the mechanism of the management of scientific and technical progress. However, a number of assumptions advanced by him are insufficiently substantiated. It is possible to group with them the set of general and particular features of the economic laws of socialism and economic regularities and the existence of the division of labor in scientific and technical progress. The interrelations of the law of value and the management of scientific and technical progress and, in particular, the necessity and possibility of using economic methods in the latter are not thoroughly revealed. The author also formulates in too complicated a manner one of the economic laws of the management of scientific and technical progress as "the law of the strengthening of the integration relations in the management of the 'science-technology-production-consumption' (S-T-P-C) cycle and the imparting of a continuous nature to the process of the management of scientific and technical progress" (p 38). Meanwhile, from the text it is evident that it is a question of the law of the unity of the management of the development of science, technology, and production. The essence of monitoring as one of the functions of the management of scientific and technical progress on the regional level is poorly revealed.

At the same time the indicated specific remarks do not decrease the theoretical and practical value of the book under review. As a whole it is a substantial contribution to the development of the conception of the management of scientific and technical progress on the regional level and will take its worthy place among the works of this new promising direction of economic science.

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CSO: 1814/72

CONFERENCES AND EXPOSITIONS

SCIENTIFIC, TECHNICAL PROGRESS-85 EXHIBITION

Alma-Ata NARODNOYE KHOZYAYSTVO KAZAKHSTANA in Russian No 10, Oct 85 pp 35-37

[Article by S. Pinchuk and O. Robinov: "The Policy Is Intensification"]

[Text] The changeover to fundamentally new technological systems and to equipment of the latest generations, which yields the greatest efficiency, the retooling of all the sectors of the national economy on the basis of the current achievements of science and technology--this is only a portion of the problems which have to be solved in the shortest possible time. The Scientific and Technical Progress-85 Exhibition, which is the largest at the Exhibition of USSR National Economic Achievements, tells about the prospect of the development of domestic science and technology.

The expositions of its 18 sections take up 12,500 square meters of indoor space and 25,000 square meters of outdoor space. At the exhibition its numerous participants are displaying about 3,000 full-scale specimens, models, and mock-ups. They show the achievements and prospects of the development of scientific and technical progress in literally all the sectors of the national economy.

Works of scientists of the USSR Academy of Sciences, the academies of sciences of the union republics, and higher educational institutions of the country are extensively represented.

The visitors are familiarizing themselves with flexible systems of the automation of the scientific experiment, equipment for X-ray pulse research, radar instruments for the study of planets, new materials for optics and quantum electronics, and many other scientific developments.

The exposition of materials with preset properties (corrosion-resisting and cold-resistant, amorphous, ultrapure, refractory, and heat-insulating materials), as well as items made of composite materials are arousing great interest.

Developments of Soviet scientists in biotechnology and genetic engineering, in the area of the protection of plants, the animal world, and the environment and, the strengthening of the health of man are being displayed.

One of the most important directions of scientific and technical progress is the complete mechanization and automation of production. New equipment: metalworking complexes, which are equipped with manipulators, robotized press equipment, and new types of minicomputers and microcomputers, will become the basis for this. By means of this equipment this year it is planned to put into operation about 800 plant technical management automation systems and plant management automation systems. Some 1,150 control computer complexes will ensure the operation of machines, equipment, and complex instruments in an automatic mode.

A new, higher state of automation--the use of flexible production systems, in which NC machine tools, industrial robots, transportation and storage systems, and plant technical management automation systems are united into a single complex--is now beginning.

Flexible systems make it possible in a short time with the minimum expenditures on existing equipment to change over rapidly to the output of new products, to increase labor productivity by five- to sixfold, to shorten the production cycle to one-seventh, and to increase the utilization ratio and machine shift coefficient by 2.5- to 3-fold.

A flexible automated section of integrated machining, which consists of three production modules: a transport robot, an automated warehouse, the automated workplaces of the production controller and the process engineer-programmer, is displayed at the exhibition.

A rotary conveyor line for the production of 100 parts made of thermosoftening plastics a minute; an automated line of the air-plasma cutting of round and rectangular pipes made of ferrous and nonferrous metals, which makes it possible to increase labor productivity by two- to fourfold; the Bulat-20 and Pusk-83 units, which are intended for the two- to threefold increase of the strength of tools are also displayed in the section "The Complete Mechanization and Automation of Production Processes in Machine Building."

Considerable space has been allotted to the automation and mechanization of assembly operations. Among the exhibits are the Val-vtulka robotized assembly complex with up to 10 parts which are being assembled and a set of equipment for the insulation of the coil and the assembly of the armatures of motor vehicle starters.

The developments, which tell about the use of new materials and about low-waste and waste-free energy- and resource-saving technological processes, are of considerable interest for specialists. For example, about the production of castings by the method of precision investment and burnt-pattern casting and of castings on automatic lines, about low-pressure die casting, about stamping with the extension of body parts, about friction welding, and about other highly efficient methods.

The mechanization and automation of production under present conditions is inconceivable without the extensive use of computer technology. The YeS-1066 computer is displayed at the exposition. Of the existing computers of the Unified System it is the one with the highest performance. The combination of

high performance, a large capacity, a main memory and a large throughput of the input-output system, and the possibility of connecting a large set of peripheral devices makes it possible on the basis of this computer to construct powerful computer systems for the most diverse purposes.

The PS-3000 multiprocessor computer is intended for the processing of a large amount of information. The high speed of such computers is achieved by means of the parallel operation of several basic computing units of the computer--the processors, each of which in essence is an independent computer.

The PS-3000 computer was developed for geophysical research, but it has different versions of software, which make it possible to use it in many fields of scientific research and production.

Among the exhibits is the SM-1800 microcomputer. It is intended for the control of production processes and units, but is also suitable for the automation of laboratory measurements and experiments. The computer is capable of carrying out computing operations and the preparation of data and of carrying out programming and instruction. The SM-1800 gave a good account of itself at enterprises with a continuous nature of production in the metallurgical, power, tractor, motor vehicle, petroleum, and gas industries and at enterprises of materials handling machine building.

Means of communication, like computer technology, are based on the achievements of radioelectronics. A special subsection acquaints the visitors with the innovations in this field.

Much attention at the exhibition is devoted to the questions of the automation of technological processes and the complete use of raw materials in metallurgy. In particular, a plant for slag granulation before the furnace, which makes it possible to improve the process by decreasing the temperature of the granulation water, is displayed here. The economic impact from introduction is 860,000 rubles.

An operating model of a cyclone unit for the smelting of synthetic slags, which are used for the refining of steel in the ladle, is displayed at the exposition. The operation of the unit is notable for the high percentage of the removal of sulfur (up to 97 percent) and reliability in operation, is put together well with existing steel smelting units, and does not pollute the environment.

The mighty energy potential, which has been developed in the Soviet Union, has become a reliable basis of the dynamic and proportionate development of the national economy. One of the sections of the exhibition shows the progress of the fulfillment of the USSR Energy Program.

The 26th CPSU Congress emphasized the particular urgency of the improvement of the structure of the power balance of the country and the decrease in it of the proportion of petroleum. An important role here is being assigned to atomic energy. During the 11th Five-Year Plan in the European part of the country it is planned to obtain by means of nuclear power plants practically the entire increase of the generation of electric power.

A standardized plan of nuclear electric power plants with water-moderated water-cooled reactors with a capacity of 1 million kilowatts in earthquakeproof design is displayed among the other exhibits at the exhibition. The use of new, advanced designs made it possible to decrease significantly the labor intensiveness of operations and the consumption of material resources. Such large electric power plants as the Zaporozhskaya, Balakovskaya, Khmelnitskaya, Rostovskaya, and Rovenskaya electric power plants are already being built in accordance with this plan.

The mock-up of the Berezovskaya GRES-I (the firstling of the Kansk-Achinsk Fuel and Power Complex) gives a clear idea of large electric power plants with a unit capacity of 6,400 megawatts, the construction of which has been started in this region.

The problems of the use in the national economy of solar, wind, and geothermal sources of energy are reflected at the exhibition.

A special exposition is devoted to the construction of the Western Siberia-Center system of main pipelines. The main one of them is the Urengoy-Pomary-Uzhgorod pipeline. The length of this giant gas line is 4,451 kilometers. It passes over the Ob, Kama, Volga, Don, and Dnieper Rivers. Millions of cubic meters of Urengoy gas were fed to consumers already during the process of construction, this speeded up the recovery of the capital investments.

A prominent place is assigned to the showing of the latest technology and equipment for the sectors of the chemical industry. Among the exhibits it is possible to note the rotary film evaporator, which has been patented in the FRG, France, and Japan. One of the sections is devoted to small-tonnage chemistry.

Various equipment is displayed at the outdoor sites of the exhibition. These are the 180-ton BelAZ-75211 open pit dump truck and the KrAZ-6437 log truck. The vehicles gave an excellent account of themselves in Siberia and the Extreme North. Among the new models is a tandem trailer dump truck, which consists of a KAZ-4540 truck tractor and a semitrailer for hauling agricultural goods.

The improvement of the unified transportation system of the country, the increase of the traffic capacity of railroads, and the automation of operations at sorting yards are important national economic problems. At the Exhibition of USSR National Economic Achievements specialists of the sector can familiarize themselves with the questions of the introduction on the basic freight traffic routes of the railroad network of automated systems for the management of large sorting yards.

The development of new nontraditional economical transportation systems arouses interest. The Transprogress Special Design Bureau is showing a means of the transportation of freight in pneumatic containers which move in a metal pipeline.

The description of the construction projects, which today govern scientific and technical progress in construction, holds a special place at the

exhibition. This is the Ust-Ilimsk Pulp Plant with a capacity of 550,000 tons of commercial pulp, which was built under one roof. This made it possible to save 2.5 million rubles on construction and installation work.

The SKZ-1393 quickly erected multisectional knock-down assembled building is arousing interest. In case of transportation its sections in a short time fold up into a compact package. A mobile multifunctional building made of completely prefabricated sections is also displayed. The output of these buildings will be set up already this year. Each square meter of such a building costs 30-40 rubles less than in standard buildings.

In the section an account is given of the renovation of industrial buildings without the halt of production by the replacement of the roof with an overhead shell with a reinforced concrete periphery and its attachment along the perimeter of the building.

Among the other exhibits of the exhibition is a solar casting yard for the heat treatment of concrete. The introduction of such a technology makes it possible to save considerable fuel.

The latest construction machines are displayed at the exhibition: the DZ-122A-13 road grader with a laser control system, the EO-3323 excavator, a general-purpose road machine with interchangeable equipment, a bank for the trenchless laying of pipes, and other innovations.

The agroindustrial complex of the country is one of the largest sectors of the socialist economy. Exhibition visitors can familiarize themselves here with new tractors--the MTZ-142T and T-330, the Don-1500, Yenisey-1200, and SK-10 Rotor combines, the SZS-8 grain drill, the KTS-10-1 cultivator, and other highly efficient equipment.

An exhibit, which tells about the complete reclamation of lands, has been set up. Advanced methods of reclamation construction, the latest equipment, polymer materials for drainage, laser systems of the control of earth-moving equipment, means of the automation and monitoring of reclamation operations are displayed here.

The achievements of scientific and technical progress are also revealed in ather sections of the exhibition: "The Timber Industry Complex," "Light Industry and Consumer Goods," "Scientific and Technical Progress for Health Care," "Equipment for the Instruction and Training of Personnel," "Scientific and Technical Progress for Labor Protection," "Standardization, Unification, Metrology for Scientific and Technical Progress."

The Scientific and Technical Progress-85 Exhibition is furnished with audio-visual equipment, video recorders, projection televisions, information boards, and large-screen sets for the showing of video movies and scientific and technical movies.

A set of educational propaganda measures: conferences, seminars, schools of advanced know-how, speeches of scientists and specialists, will be implemented on the basis of the exposition. It is proposed to use actively all the

sections of the exhibition for the vocational guidance of school children and students of vocational and technical schools and the instruction of students.

Our country is heading toward the 27th party congress, at which the means of economic and social development for the next few years will be specified. The foundation of future achievements is being laid already today by the dedicated labor of the Soviet people. The concluding year of the five-year plan has become a year of new achievements in the acceleration of scientific and technical progress. The Scientific and Technical Progress-85 Exhibition is convincing evidence of this.

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CONFERENCES AND EXPOSITIONS

COMMERCIAL CULTIVATION OF MICROALGAE

Ashkhabad TURKMENSKAYA ISKRA in Russian 20 Sep 85 p 3

[Article (TURKMENINFORM): "The Commercial Cultivation of Microalgae"]

[Text] The All-Union Conference, which opened on 17 September at the Turkmen SSR Academy of Sciences, is devoted to this theme. Specialists of the USSR Academy of Sciences, the academies of sciences of the union republics, sectorial scientific research institutes, and higher educational institutions of the country are taking part in its work. In the Basic Directions of National Economic Development for the 11th Five-Year Plan attention is directed to the need for the significant increase of the volume of output of the microbiological industry, the enlargement of the assortment and the increase of the quality of products, and the development of new technological processes. In this connection the development of the commercial cultivation of microalgae and the intensification of the work, which is aimed at the development of the technology of obtaining new products for the national economy, are of great importance.

In the course of 3 days the conference participants will hear and discuss more than 100 reports on the achievements of modern biotechnology in the practice of the microbiological industry, on the technology of the production and processing of microalgae, and on new fodder and food products which are being obtained on the basis of microalgae.

At the conference means of expanding and coordinating the research in the area of the commercial production of microalgae will be outlined and the priority tasks of the strengthening of the contact of science with practice will be specified.

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CONFERENCES AND EXPOSITIONS

PREVENTION OF HARMFUL EFFECTS OF CHEMICALS ON MAN, NATURE

Kishinev SOVETSKAYA MOLDAVIYA in Russian 12 Oct 85 p 3

[Article by ATEM correspondent D. Chubashenko: "The Completion of the Work of International Courses"]

[Text] On 12 October the international educational courses on the prevention of harmful effects of chemical compounds on man and ecosystems are concluding their work in Kishinev. They were organized by the UN Environmental Program (UNEP), the World Health Organization (WHO), and the USSR State Committee for Science and Technology (GKNT).

"For 3 weeks specialists from 13 countries of Europe, Asia, Africa, and Latin America held meetings in Moscow, Kiev, and Kishinev," said Ahmad Dashash, leader of the courses and head of the Chair of Medicine of Damascus University. "We examined in detail how the use of various chemical substances affects nature and man and discussed methods of implementing preventive measures. We saw how the problems of protecting nature and the health of people are being solved in practice in the Soviet Union. I am confident that everyone will find in the experience of the USSR something necessary and useful for his country."

"When we discussed the problems connected with the harmful effect of chemical substances on ecosystems," Dr Ahmad Dashash continued, "by analogy we thought about chemical weapons. Whereas we have been forced to use various fertilizers and pesticides, the development of chemical weapons is a crime. This barbarian means of annihilating people should be eliminated."

"Each year hundreds of new chemical compounds appear in the world," said Michael Gilbert (Belgium), a UNEP associate. "The goal of our courses was also to convey to specialists from Asia, Africa, and Latin America the experience, which has been gained in more developed countries and makes it possible to decrease substantially the pernicious effect of harmful substances on ecosystems. I believe that we achieved this goal. The fact that the courses were organized well also contributed to this. The Soviet Union has always cooperated actively with UNEP, by helping in implementing our projects."
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CONFERENCES AND EXPOSITIONS

BRIEF

STATE PATENT INFORMATION SYSTEM--(KAZTAG)--An all-union seminar on the problems of the functioning and development of the state patent information system is being held at the Kazakh Scientific Research Institute of Scientific and Technical Information attached to the Kazakh SSR State Planning Committee. This system, by using modern hardware and methods of the accumulation, processing, retrieval, and issuing of information on inventions, is contributing to the high level of the equipment and technology being developed and to their competitive ability on the world market. The questions being discussed are aimed at the accomplishment of the tasks which were posed by the April (1985) CPSU Central Committee Plenum and by the conference in the Central Committee on the acceleration of scientific and technical progress. Responsible officials of the USSR State Committee for Inventions and Discoveries, the USSR State Committee for Science and Technology, and the Kazakh SSR State Planning Committee, executives and leading specialists of institutes and sectorial centers of scientific and technical information and of the patent services of enterprises and organizations of Kazakhstan and the republics of Central Asia and Transcaucasia are participating in the seminar. [Text] [Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 28 Sep 85 p 2] 7807

CSO: 1814/75

AWARDS AND PRIZES

BONDARCHUK AWARDED ORDER OF FRIENDSHIP OF PEOPLES

Moscow VEDOMOSTI VERKHOVNOGO SOVETA SSSR in Russian No 32, 7 Aug 85 p 504

[Ukase No 2980-XI of the Presidium of the USSR Supreme Soviet of 26 July 1985 "On the Awarding to Academician of the Ukrainian SSR Academy of Sciences V.G. Bondarchuk of the Order of Friendship of Peoples"]

[Text] For services in the development of geological science and the training of scientists and in connection with his 80th birthday to award Academician of the Ukrainian SSR Academy of Sciences Vladimir Gavrilovich Bondarchuk the Order of Friendship of Peoples.

[Signed] Chairman of the Presidium of the USSR Supreme Soviet A. Gromyko

Secretary of the Presidium of the USSR Supreme Soviet T. Menteshashvili

Moscow, the Kremlin. 26 July 1985

No 2908-XI

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CSO: 1814/70

AWARDS AND PRIZES

YAKOVLEV AWARDED ORDER OF FRIENDSHIP OF PEOPLES

Moscow VEDOMOSTI VERKHOVNOGO SOVETA SSSR in Russian No 32, 7 Aug 85 p 504

[Ukase No 2909-XI of the Presidium of the USSR Supreme Soviet of 26 July 1985 "On the Awarding to Academician of the Kirghiz SSR Academy of Sciences V.G. Yakovlev of the Order of Friendship of Peoples"]

[Text] For services in the development of biological science and the training of scientists and in connection with his 70th birthday to award Academician of the Kirghiz SSR Academy of Sciences Vladimir Georgiyevich Yakovlev the Order of Friendship of Peoples.

[Signed] Chairman of the Presidium of the USSR Supreme Soviet A. Gromyko

Secretary of the Presidium of the USSR Supreme Soviet T. Menteshashvili

Moscow, the Kremlin. 26 July 1985

No 2909-XI

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GENERAL

INFLUENCE OF SCIENTIFIC, TECHNICAL PROGRESS ON ECONOMY

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 7, Jul 85 pp 87-88

[Review by Academician of the Ukrainian SSR Academy of Sciences S. Yampolskiy and candidate of economic sciences V. Kiforak of book "Ekonomika i naukovo-tekhnichniy progres" [The Economy and Scientific and Technical Progress] by S.V. Kozachenko, "Naukova dumka", Kiev, 1984, 152 pages]

[Text] In the book under review (Footnote 1) (S.V. Kozachenko, "Ekonomika i naukovo-tekhnichniy progres" [The Economy and Scientific and Technical Progress], Kiev, "Naukova dumka", 1984, 152 pages) the basic problems of the influence of scientific and technical progress on the economic development of the country are covered. The author, in noting the dual nature of the end results of scientific and technical progress, links it not only with the profound, qualitative changes in equipment and production technology, but also with its direct influence on the social component of productive forces. The new tasks on the improvement of mature socialism also predetermine the fundamentally new strategy of scientific and technical progress, the essence of which consists in accomplishment a historical task--the fundamental combination of the achievements of the scientific and technical revolution with the advantages of socialism management. In the work, on the basis of extensive statistical information materials, it is convincingly shown how this strategy is being implemented in the national economic complex of our country.

The author examines the problems of the increase of the level of equipment and production technology, which hold a leading place within its material and technical base and play a decisive role in the further increase of the productive force of labor. Attention is correctly focused on the fact that machine building for the present is still inadequately meeting the increased needs of the national economy for modern sets of equipment and systems of machines. The achievement of a leading growth rate of machine building sectors in conformity with the fast pace of scientific and technical progress should become an immutable demand on technical policy with respect to tools of labor already during the 12th Five-Year Plan and should increase at an accelerating pace. The realization of this demand, as is shown in the book, is being ensured by the development of fundamentally new machines and systems of them on the basis of the implementations of the achievements of basic science, as well as by the further improvement of the parameters of operating

equipment and the improvement of its technical and economic characteristics by means of the modernization of equipment.

The development of complete machine systems and flexible machine systems, as the author correctly notes, is the main direction which will make it possible to solve one of the most contradictory problems of scientific and technical progress: to ensure the combination of the systematic complication and specialization of equipment with the more and more frequent change of the objects of production. The basic directions of the development of new production technologies and their importance in the increase of the efficiency of social production are examined and characterized in the book on the basis of real examples.

The section, in which the role of the preliminary stage of production in the increase of the quality and efficiency of new equipment is covered, is of great interest. Here the author characterizes in a very well-argued manner, on the basis of interesting statistical material, the entire life cycle of new equipment ("research, designing, pilot assimilation, production, and use" of equipment and technology), in which the basic reserves of the increase of its quality and efficiency are found. From this standpoint the mechanism of the management of the development of new equipment and its structure, functions, and tasks are also examined; the basic subsystems of the mechanism of its management are also analyzed.

Particular attention is devoted in the monograph to revealing the questions of the economic management of designing. Noting the fundamental unity and interconnection of the economic and technical aspects in designing, the author formulates several underlying principles of the construction of the economic mechanism of designing.

The monograph also does not lack, in our opinion, several shortcomings. The author should have devoted more attention to such an important direction of scientific and technical progress as resource-saving technologies and should have described the group of economic and organizational problems of the management of their development and introduction. It would also have been advisable to cover the problems of the improvement of the new organizational forms of scientific and technical progress, which at present are assuming great importance, and the establishment of academic scientific and technical complexes and engineering centers in the republic.

However, the made remarks do not make changes in the overall positive assessment of the book under review. This is a successful attempt to examine the problems of the acceleration of scientific and technical progress in interconnection with the development of the economy. The extensive statistical material, which characterizes the domestic and foreign practice of managing research and development, was used well in the monograph. Along with the coverage of the experience in improving the economic management of scientific and technical progress, a number of interesting organizational problems in this field of economic management are raised.

The book is of value for a wide range of readers, who are interested in the economic problems of scientific and technical progress, and may be useful to specialists who are engaged in studies of these problems.

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GENERAL

RESEARCH, DEVELOPMENT AT RSFSR HIGHER EDUCATIONAL INSTITUTIONS

Moscow AGITATOR in Russian No 23, Dec 85 pp 32-35

[Article by RSFSR Minister of Higher and Secondary Specialized Education academician I. Obraztsov under the rubric "Culture and Morals": "The Reserves of Science of the Higher Educational Institution"]

[Text] The science of the higher educational institution in our country has a truly enormous potential. It is possible to judge it on the basis of the example of the system of the RSFSR Ministry of Higher and Secondary Specialized Education. There are 130,000 scientific associates concentrated here.

The total amount of scientific research work, which was performed in the RSFSR Ministry of Higher and Secondary Specialized Education in 1984, came to 680 million rubles. This is approximately threefold more than that of such a well-known detachment of Soviet science as the Ukrainian Academy of Sciences. At the same time the fact that higher educational institutions can increase the amount of scientific research work by 2- to 2.5-fold was spoken about at the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress. Here particular attention should be devoted to the elimination of the duplication of scientific developments and to the increase of their quality and efficiency and the return of the assets invested in research.

Indeed, reserves exist. Let us take our intellectual potential. Up to one-third of the total number of scientists and nearly half of the candidates and doctors of sciences of the country work at higher educational institutions. In all 500,000 instructors work here, 60,000 graduate students are undergoing training. An extensive network of permanent scientific subdivisions--1,300 problem and sectorial scientific research laboratories, design and technological bureaus, 50 scientific research institutes--functions in the higher school. Today about 100,000 scientific studies and developments are being performed at the higher school of the country.

This year the RSFSR Ministry of Higher and Secondary Specialized Education is completing the experiment on the development of a new form of scientific research work at the higher school--the cost accounting scientific association. The goal program method of organizing research and development

(NIOKR), which is formed according to the arrangement: "problem--goal--program--resources--end results," was made the basis of its activity. Among the operations carried on the state budget the proportion of the most important research, which is of prime importance for the national economy, increased to 90 percent, and it is being financed in accordance with supply orders. The unity of the educational and scientific processes, the centralized service of research and development, and the management of research by means of economic stimulation and uniform standard methods documents are being ensured.

On 10 June 1985 the preliminary results of our work were reported to the Presidium of the RSFSR Council of Ministers and received approval and support. Therefore, it is worth telling in greater detail about the basic results of the experiment being conducted.

The main thing is the concentration of the significant forces of scientists of higher educational institutions on the solution of important national economic, intersectorial, sectorial, and regional problems. The association is taking part in the fulfillment of 134 programs of the USSR Council of Ministers and the State Committee for Science and Technology (GKNT). In 15 programs higher educational institutions are the main institutions, and the programs are being fulfilled jointly with the leading sectors by the forces of temporary scientific collectives. More than 80 percent of the work is being performed on the most important themes. The comprehensive goal programs are oriented toward obtaining specific developments--models of equipment, new technologies.

The effectiveness of the new organizational mechanism increased, when the management staff of the association when planning developments began to envisage their supply with material resources and shifted from the level of orders "chair--enterprise" to the level "ministry--ministry."

Fundamental and basic research, as is known, is the basis of applied developments. Many fundamentally new technologies have been developed on their basis. Many discoveries of higher educational institutions have received extensive recognition in industry.

The association directed efforts at the development of an enormous reserve of fundamental and basic scientific research, which in general is becoming obsolete. Of course, at the first stage we began its implementation, trying at the same time to update it and maintain it at the proper level. In addition to the 60 million rubles, which the State Committee for Science and Technology is allocating to us for budget-carried themes in accordance with established procedure, we allocated for these purposes another 65 million rubles within the framework of economic contracts with the leading sectors of the national economy. Today the amount of basic research has been increased significantly.

During the experiment it was possible to achieve a slight acceleration of the introduction of the developments of higher educational institutions in practice. In particular, it was possible to achieve this for 15 comprehensive

programs of the USSR Ministry of Higher and Secondary Specialized Education with an annual amount of work of 77 million rubles.

The introduction of the results of the work, which is being performed within these programs, is being carried out at the base enterprises of the client ministries by temporary joint groups of introduction, which were formed from associates of the higher educational institutions, which are the performers of the program, and associates of the client enterprises. Here are specific examples.

The Tomsk Institute of Automated Control Systems and Radioelectronics developed an interdepartmental automated information system of the registration and operation of motor transport. It ensures the accumulation, storage, retrieval, and processing of information on transportation equipment. Its use is especially urgent for the planning, accounting, and monitoring of the consumption of spare parts, fuel, and lubricants, the preparation of drivers, the monitoring of the use, and the prompt search for motor transport equipment. The system was realized on a computer of the unified series and functions in the interactive mode. It has been operating successfully for about 5 years in Tomsk, Leningrad, Yerevan, and Alma-Ata. The universal introduction of this system is advisable, but departmental barriers are hindering this.

The Altay Polytechnical Institute developed for tractors a durable track train with rubber-metal hinges. This is ensuring a three- to fourfold increase of the durability of the caterpillar tracks of the tractor, the decrease of the consumption of high-alloy castings, and the increase of the efficiency and productivity and saves 1.5-2 tons of diesel fuel a year per tractor. The annual economic impact with allowance made for the number of tractors, which are necessary for the country, may come to 80 million rubles.

The method of the vacuum diffusion welding of metallic and nonmetallic materials, which ensures the production of components in which the compounds have all the properties of the source material and increased strength, is of great interest. Expensive solder, fluxes, and electrodes are not needed here. The technology is harmless to man and the environment. The economic impact exceeds 100 million rubles. The work was performed at the Moscow Aviation Technological Institute under the supervision of Professor N. Kazakov and in 1984 was awarded the Lenin Prize.

The technology of obtaining ultrapure substances, which was developed at Gorkiy University, is also of great importance. In particular, ultrapure lead oxide was obtained and is being used as a phototarget of a color camera tube. This made it possible to organize starting in 1980 the industrial production of such tubes and to become free of imports. The annual saving in foreign currency comes to 12-14 million rubles. Since 1981 all the television studios of the country have been operating on domestic equipment. Since 1983 the tubes have been exported to the CEMA countries.

The production of ultrapure substances, which are used in new equipment, has been organized at Gorkiy University.

A large role in accelerating the introduction of the results of scientific research in practice belongs to the design organizations of higher educational institutions. The results of research and development, in which new physical phenomena and effects have been used, are introduced most rapidly after preliminary design analysis at the design bureaus of higher educational institutions. Taking this into account, the association developed intensively a network of design organizations at higher educational institutions. Of the 25 design organizations now in operation 10 were established during the period of the experiment.

One should also assign to the unquestionably positive result of the experiment the fact that the cohort of managers of the new type--rectors of higher educational institutions, executives of scientific research institutes, design bureaus, and programs--increased in the process of conducting it in the Ministry of Higher and Secondary Specialized Education. These are people with initiative, who have risen to the full extent to the level of understanding of the state tasks and are capable of being in charge of comprehensive programs.

The experience, which has been gained by the RSFSR Ministry of Higher and Secondary Specialized Education and the higher educational institutions subordinate to it in the modernization and intensification of the educational scientific training process, is of considerable interest.

First of all, in revising the curricula and syllabuses we are basing ourselves on the need for the decrease of the mandatory lecture hall classes and the making of more time available to the student for independent work under the supervision of the instructor. The experience of Leningrad, Novosibirsk, and Tomsk Universities, the Moscow Physical Technical Institute, the Leningrad Electrical Engineering and Polytechnical Institutes, the Ufa and Kazan Aviation Institutes shows that the policy of the independent, creative work of students is becoming the basis of the training of specialists.

Within the comprehensive goal programs on the development of automated systems of scientific research (ASNI) and computer-aided design systems (SAPR), in which 90 higher educational institutions of the RSFSR Ministry of Higher and Secondary Specialized Education are participating, the most advanced methods of teaching, which have shown great efficiency, were formed and are already being used today.

Advanced computer technology is being actively introduced into the educational process. Thus, Novosibirsk University jointly with the scientific institutions of the Siberian Department of the USSR Academy of Sciences obtained encouraging results from the introduction in the educational process of terminal classes, which interact with databanks, when studying such subjects as physics, chemistry, economics, and several others.

In the future we have to develop automated databanks of educational, scientific, and technical information on the majority of subjects, to develop methods of their use, to ensure the circulation of the educational information for all higher educational institutions, as well as to organize the training and advanced training of teaching and technical personnel.

At a number of educational institutions educational systems of computer-aided designing and research engineering are being put into operation, databanks are being established for them. The collectives of the Leningrad Institute of Aviation Instrument Making, the Leningrad Electrical Engineering Institute, the Ivanovo Power Institute, the Kazan Aviation Institute, the All-Union Correspondence Machine Building Institute, and the Moscow Machine Tool and Tool Building Institute are working successfully in this direction.

The intensification of the educational process involves the development of new effective organizational forms of it, the reform of the psychology of students and instructors, and the retooling of the higher school. On this level the experience of several leading higher educational institutions is valuable. The Taganrog Radio Engineering Institute came forth as one of the initiators of the implementation of the principle of the unity of the educational process, the scientific research of instructors and students, and active forms of the education and Marxist-Leninist training of specialists. It was the first to establish a sound educational scientific production complex (UNPK), having united the educational and scientific subdivisions of the higher educational institution, and ensured an inseparable connection with production and industrial and academic scientific research institutes and design bureaus.

Today it has concluded 27 direct contracts with enterprises of a number of ministries and is carrying out the purposeful training of engineers. The performance of practical production work is being organized, planned scientific operations and graduation projects are being fulfilled, and the graduates of the higher educational institution are being assigned on the basis of contracts. The fundamental combination of educational, scientific, and production work had a positive effect on the academic activity and progress of the students: the number of students with fair grades has decreased significantly, the drop-out rate has decreased to one-half.

Moreover, by being involved in the production and research process, by associating with workers, specialists, and scientists, and, finally, by feeling for a long time the influence of the production collective, students obtain the life experience which they lack and the opportunity to follow the example of elders. This has a beneficial effect on the formation of the personality of the future specialist.

The use of the creative and scientific potential of the higher educational institution and the formation of important scientific directions made it possible to solve important national economic problems and to ensure the continuity of the scientific production process, starting with basic research and experimental design developments to the production of prototypes and their presentation for introduction in industry.

Finally, the educational scientific production complex improved significantly the conditions of the training of science teachers of the highest skills, doctors and candidates of sciences, who are capable of rising from the information methods of instruction, in case of which only a large amount of systematized knowledge is conveyed to students, to its methodological principles, inquiry, research, and creative work.

At present a scientific research institute, four sectorial scientific research laboratories, a computer center, a number of faculties, scientific research departments, and laboratories, an experimental shop, and four student design bureaus have been organized within the educational scientific production complex. All the scientific research forces of the institute are concentrated in 8 important scientific directions, within which 13 comprehensive scientific and technical operations and programs of the State Committee for Science and Technology, the USSR Academy of Sciences, the State Planning Committee, and the USSR and RSFSR Ministries of Higher and Secondary Specialized Education are being fulfilled.

The comprehensive goal program on the development of multiprocessor computer systems with a programmable architecture is an example of efficient work. More than 10 higher educational institutions and 6 very large scientific production associations of industry are taking part in the fulfillment of the programs, in which the institute is the main institute. The institute and enterprises developed and produced in a record short time--in only 8 months--a unique microprocessor which does not have analogues. The development of computers with a very high performance is being completed on its basis. The total amount of research and development, which is being performed by the educational scientific production complex, came to 9 million rubles. The confirmed economic impact is 92 million rubles, that is, approximately 3 rubles per ruble of expenditures.

But the most important thing in the work of the educational scientific production complex is the fact that all the scientific subdivisions serve as a base for the training of specialists, all students are involved in their work. A workday each week is made available to students for the performance of mandatory research. The majority of scientific associates are participating in teaching work, instructors are participating in scientific research, which at the higher educational institution is conducted over the entire cycle--from the idea to the production of a prototype of the new item.

The front line of the campaign for the acceleration of scientific and technical progress today lies through science. The achievements of Soviet scientists in various spheres of knowledge and technical progress are universally recognized. But we look at what has been achieved through the prism of time--the requirements of the resolute turn of science toward the needs of production, and of production toward science. For this all the difficulties, which are hindering the uniting of scientific research with the introduction of its results in practice, have to be eliminated. And there are still many such difficulties.

A large number of developments of higher educational institutions do not reach practical introduction. The reasons are most diverse. Industry far from always has confidence in our work. The shortcomings in planning, when the developments of higher educational institutions are not included in the sectorial plans of introduction, interfere. The higher educational institutions themselves also have many shortcomings. Their pilot experimental base is weak. In a number of places difficulties are being experienced with the supply of the necessary materials, reagents, and advanced computer technology.

At some higher educational institutions the proportion of developments, which are not of practical importance, is still great, the dispersal of scientific forces and duplication are being allowed. There are frequent instances when operations never conclude with introduction, while the certificates on their use in production are drawn up formally. The efforts of the scientists of higher educational institutions are far from always concentrated on the solution of the most important problems, which determine the level of equipment and technology in the sectors of the national economy, research is being performed on unplanned themes to the detriment of planned themes. Hence the inefficient use of scientific forces and expensive equipment.

Work also has to be done in order to achieve a change in the frames of mind of the professors and instructors and, what is the main thing, students, the future specialists, in order to aim their thoughts and interests at the acceleration of scientific and technical progress. After all, how quickly higher educational institutions will be able to expand the participation in research, which is of national economic importance, will depend on joint efforts. And, finally, until the higher school is recognized organization organizationally and in the planning and financial respects as a scientific organization, its scientific potential will be used inefficiently, while the level of training of specialists will lag behind the requirements of the times.

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GENERAL

MONITORING RESEARCH AND DEVELOPMENT

Moscow TEKHNIKA I NAUKA in Russian No 10, Oct 85 pp 29-30

[Article by M. Dzliyev, scientific organization department manager, All-Union Council of Scientific and Technical Societies: "Program Tracking: Experience from the 11th Five-Year Plan Applied to the 12th Five-Year Plan"]

[Text] One hundred and seventy general union scientific technical programs in the 11th Five-Year Plan... The results are new instruments, machines and mechanisms and progressive technological processes. But this is still the solution of the most important social economic problems. Within the framework of these programs, for example, it was proposed to save labor of about 3 million men, save more than 4 million tons of metal, 50 million tons of fuel equivalent and 14 billion kilowatt hours of electricity.

And to be sure, the scientific and technical community could not stand aside from a task of such scale and content. We have strict forms of reciprocity with the state organs: one can boldly talk about the state-community approach to tracking the general union scientific technical programs.

And in this sense the societies have broad capabilities at their disposal. The 12 million scientists, specialists and workers--production innovators (about 10 percent of the total number of works in the country)--are members of the scientific technical community in the USSR scientific technical societies. The annual budget is about 49 million rubles, more than 36 million of which is expended on scientific and technical activity. More than 1.5 million suggestions and recommendations directed toward improving social production are presented annually from scientific and technical society organizations and their creative groups (700,000) to the planning and economic organs.

Thus, program tracking...

How was it expressed in practice? Scientific and technical societies participate in the formation, accomplishment and evaluation of the results of general union scientific technical programs at all levels: all-union, branch, regional and enterprise and organizational. Our representatives participate in the work of state commissions in putting together these programs and in checking the results of socialist competition and in state coordinating councils. The scientific and technical society councils orient the best

creative plans of specialists and creative social organization of workers toward the accomplishment of program developments in enterprises and organizations. Cooperative, balanced work by regional scientific and technical society councils and scientific technical information centers of the State Committee for Science and Technology (together with the All-Union Society of Inventors and Innovators) for information support, even in the geographical sense of leading experience, is very, very broad.

Latvian SSR. Here in order to track individual tasks of all-union programs, society working groups composed of representatives from the Republic Scientific Research Institute for Scientific and Technical Information and Technical Economic Research, scientific and technical society councils and boards of administrators and enterprise and organization specialists were formed. Such groups track the results of program developments, subject plans for research and plans for new equipment. From this point of view, the problems are supporting the work with technical documentation; material and technical, labor and financial resources and capital investment. If a break is noted, a working group analyzes the cause and makes suggestions to forestall unfortunate consequences.

The Latvian Republic Scientific and Technical Society Council and the Latvian Scientific Research Institute for Scientific and Technical Information monitor the process of task accomplishment and stages of 24 general union programs.

Georgian SSR. The functions of the strong links in the Georgian Communist Party Central Committee republic coordination committee for science and scientific and technological progress repose in the scientific and technical society organizations in this republic (TEKHNIKA I NAUKA, 1985, No 5).

But in any case, the socialist competition is truly a powerful instrument for accelerating program developments. Its organizational form is a system, the structure of which can be private or collective development plans, labor cooperation between laboratories, sectors, and departments, contests, movement for a communist attitude toward labor and, finally, participation in the all-union socialist competition for successful accomplishment of tasks in the general union scientific and technical programs and also in the competition between organizations and co-executive agents (to accelerate the accomplishment of program tasks and stages as the basis for agreements in creative cooperation), in branch and regional competitions between organizations with similar scientific and technical profiles.

Special attention is given to all-union socialist competition. Collectives directly accomplishing tasks in the programs participate in it. They take on socialist responsibilities and use counter plans. Twenty-five CPSU Central Committee, USSR Council of Ministers, All-Union Central Trade Union Council and Technological and Economic Research and the Komsomol Central Committee Challenge Red Banners and monetary prizes have been awarded to the victors. Winning collectives are determined in stages. First, USSR ministries and agencies, union republic councils of ministers, trade union organs and scientific and technical society organizations: they present their propositions to special state-public commissions created by the State Committee for Science and Technology and All-Union Council of Scientific and Technical Societies.

Then, in the second stage, the suggestions are widely introduced and the corresponding materials for awarding the winners are prepared. Since 1983, this commission has been in continuous operation. In the sense that it systematically reviews the progress of labor rivalry, it generalizes and spreads the advanced experience and assists in organizing socialist competition. In 1984, 2800 labor collectives (7,100 agreements) participated in such a competition and as a result of the fulfillment period, 330 tasks and program stages were shortened with 106 by more than one-quarter.

Leningrad...Here, at the initiative and under the supervision of the oblast party organization, the territorial branch program "Intensification-90" was worked out. Its fulfillment means that during the 12th Five-Year Plan each year labor productivity will increase by no less than 4 percent and as a result the relative amount of products in the highest quality categories will be increased 1.8 times and the level of manual labor reduced from 37 to 27 percent.

Within the framework of this task, the Leningrad Oblast Scientific and Technical Society Council worked out a system of public support for all-union, branch and regional programs.

What is the form of public work here? It is: conferences, meetings, competitions, inspections and public boards of experts on the technical level of new equipment created by Leningraders; consultation assistance to enterprises and organizations; increasing the qualifications of program executive agents; action to increase the quality of information support and development of recommendations for accelerating the introduction of programed developments. Essentially, the work is organized as in many other regions but the Leningraders have their own local form of public activity. These are, for example, reporting interbranch problems to the directorate organs, formulating problems to be introduced into the program, planning scientific technical programs and so forth.

* * *

In 1984 alone, scientific and technical societies completed more than 6,000 tasks from general union programs. And, nonetheless, in the preparation for the 12th Five-Year Plan we must think more about it.

What kind of technology is there for controlling program accomplishment on a general state level? This control occupies at a minimum three organs--the state coordination committee, the public coordination committee and the commission for determining the results of competitions and disseminating advanced experience. In regions the scientific and technical and technical economic councils (of party organs), scientific technical information centers of the State Committee for Science and Technology and oblast (republic, kray) scientific and technical society councils are occupied with the questions of tracking programs. And as a result there is parallelism and redundancy... It is not by accident that even in a USSR Supreme Soviet session the suggestion was put forward to create a state public organ for introducing achievements of science and technology into production.

More than that, there are already examples of such approaches to this matter.

The State Committee for Science and Technology and the All-Union Council of Scientific and Technical Societies decided to organize a state public coordination council for the general union scientific and technical program to create resources for mechanizing loading and unloading. In the 12th Five-Year Plan it has been suggested that this practice be expanded not only in the general union but also in branch and regional programs.

There are still other reserves: information maintenance to program executive agents... It can be boldly said that now a system has already been created to bring program tasks and stages to the enterprise and the executive agent organization level. But it is necessary to go further: to take this system, disseminate its action to the shops, departments, laboratory, brigade and every part of the program developments. There is much that can be done here by the scientific and technical society primary organization councils.

Further--socialist competition...

In its organization among working collectives, attention is given only to the quantitative indicators--to fulfilling tasks ahead of time--to the detriment of quality indicators, that is, the technical level of the equipment developed.

Yes this is true: in 1984 competition made it possible to reduce the time for accomplishing program tasks. But did this lead to a chain reaction of fulfilling all other tasks ahead of time and did it impact on the program as a whole? Of course, the design documentation was prepared 6 months ahead of time (in June instead of December). Is this a guarantee that the leading organizations will later turn this development into metal? Can it provide the people and material resources not only for its planned work, but also for this unexpected achievement which is in excess of the plan and has been dumped on them? Obviously, the next stage will begin at the planned time and the blueprints will sit on the shelf for 6 months. Therefore, it is necessary to orient the competition participants to a high technical level of development for the timely accomplishment of tasks.

The program and goals method of science and technology development require a corresponding purposeful approach to the activity of scientific and technical society organizations. For example, the staged dislocation of the center of gravity from one form of work to another.

At the beginning of the five-year plan as a basis for this action, there were scientific and technical conferences and symposia at which the theoretical problems connected with putting together programs are solved.

A further foundation is competitions of an investigative nature (for the best construction of a device, vehicle, equipment).

Then, there are meetings on problems of achieving results in programs. At this stage it is necessary to create a network of consultation points.

And finally, the final stage is an inspection of the program developments introduced into production, the new equipment produced and the progressive technology. And here also there are public boards of experts on the program developments and seminars on the distribution of advanced experience of the executive agent organizations.

It is necessary to remember that scientific technical programs already worked out for the 12th Five-Year Plan will be hierarchical: general union, republic (inter-republic) branch (interbranch) and territorial and production complex and regional scientific and technical programs. The scientific and technical society must be prepared to track them at all stages.

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BIOGRAPHICAL INFORMATION

ALEKSANDR IVANOVICH BARAYEV OBITUARY

Moscow IZVESTIYA in Russian 12 Sep 85 p 3

[Article: "Aleksandr Ivanovich Barayev"]

[Text] Agricultural science has suffered a serious loss. Full Member of the All-Union Academy of Agricultural Sciences imeni V. I. Lenin Aleksandr Ivanovich Barayev, a prominent scientist, a deputy of the Kazakh SSR Supreme Soviet, a Hero of Socialist Labor, Lenin Prize winner, an honored figure of science of the Kazakh SSR, and director of the All-Union Scientific Research Institute of Grain Farming, died on 8 September 1985 at the age of 77 after a long illness.

A.I. Barayev was born on 16 July 1908 in the city of Leningrad. In 1930 he graduated from the Kuybyshev Agricultural Institute. He worked as the manager of a department of a kolkhoz and a scientific associate of a testing station in Kuybyshev Oblast. From 1936 on his entire life of labor was connected with Kazakhstan, where he worked as a scientific associate and director of the Ural Testing Station and the Kazakh Scientific Research Institute of Agriculture.

From 1961 to the last days of his life A.I. Barayev headed the All-Union Scientific Research Institute of Grain Farming. The development of our modern agronomic science and the development of virgin and fallow lands are connected with his name. The soil-protection system of farming, which was developed under his supervision, found extensive application at the kolkhozes and sovkhozes of the country.

The entire life of A.I. Barayev is an example of devoted service to the people and the Communist Party, in the ranks of which he was for more than 40 years. A thorough knowledge of agricultural production and purposefulness and persistence in scientific activity and the introduction of the achievements of science in practice distinguished him.

A.I. Barayev actively participated in community political work. He was a deputy of the USSR Supreme Soviet, 6th Convocation, and a deputy of the Kazakh SSR Supreme Soviet, 4th, 5th, and 7th-11th Convocations.

The Communist Party and the Soviet state rated highly the scientific, production, and social services of A.I. Barayev. He was awarded the title of

Hero of Socialist Labor, three Orders of Lenin, the Orders of the October Revolution and Friendship of Peoples, the Badge of Honor, and many medals.

The blessed memory of the communist scientist and well-known organizer of agricultural science, Aleksandr Ivanovich Barayev, will remain forever in the hearts of the Soviet people.

[Signed] M.S. Gorbachev, A.A. Gromyko, D.A. Kunayev, Ye.K. Ligachev, N.I. Ryzhkov, N.A. Tikhonov, V.P. Nikonov, Z.N. Nuriyev, G.I. Marchuk, A.P. Aleksandrov, V.A. Karlov, V.A. Medvedev, N.Ye. Kruchina, V.K. Mesyats, I.I. Skiba, A.A. Nikonov, Yu.A. Ovchinnikov, B.A. Ashimov, N.A. Nazarbayev, A.P. Rybnikov, N.Ye. Morozov, M.G. Motoriko, K.U. Taukenov, T.S. Maltsev, N.Z. Milashchenko, K.U. Medeubekov, I.S. Shatilov, A.N. Kashtanov, I.P. Makarov, M.K. Suleymenov

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